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FOOD MANUFACTURE

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Food Prospects

IN the first weeks of the year the prospects seem better than earlier had been anticipated, although some of these prospects turned out on examination to be little beyond statistical estimates.

The Canadian and Australian wheat agreements are firm and they cover the British basic requirements. Heavy rains in Australia have finally brought the harvest to about six million tons, or possibly rather less. Of this some two million tons will be shipped to this country with a fraction of it delivered *en route* to the Malayan market. India will benefit under her own agreement to the tune of about 750,000 tons.

The American winter wheat prospects are now far brighter than they were a month or two since. Farmers have been planting beyond the usual date, encouraged by timely rains, and the crop in 1948 from winter wheat may reach 42 million tons. This will still be about six million tons below the record pre-war crop; but since the winter wheat crop in U.S.A. accounts for about 75 per cent. of total wheat, we can trust that a disaster has been averted. The acreage is high, but it is far too early to conjecture on average yields, which for several reasons are likely to fall below the 1947 level.

Meanwhile, the poor 1947 maize crop will almost certainly lead to a cut in livestock figures. The pig population, it is pessimistically suggested, will have to be cut by 30 per cent. in the present year, and the fat cattle population will fall by seven or eight per cent. There might accrue certain advantages from this, if a good maize crop in 1948 yields a surplus over domestic demands that could be shipped to the European market. On the other hand, we cannot ignore the possibility that the condition of the maize reserves might bring the United States into the Latin American market for feedingstuffs. The unstable condition of the food market in the States and the indisputable dangers of fresh soil erosion are perturbing the minds of the farm communities, particularly on the wheat belt, and we shall hear more of this as the election campaigns reach their early stages.

The prospects for rice are clearly better than they were at this time last year and that must always relieve the British position. The smaller the quantity of wheat and coarse grains that have to be diverted to the Indian market, the more secure the British level of consumption.

The total world rice crop may be 25 per cent. higher than it was in the period from mid-1946 to mid-1947, and this gain, though not evenly distributed over the rice areas of the world, would at least imply a basic export surplus from some of the vital producing countries. Burmese recovery has been considerable and will give the new government of that country a probable yield of 240 million bushels, a rise of about 20 per cent. over last year's harvest. This may yield an export surplus of approximately 1½ million tons, and it can be assumed that much of this will, as in the pre-war period, be shipped to India. India's rice acreage is not much higher than it was last year; but there is some probability that average yields will be slightly better. Siam's increase will be perhaps of the order of 25 per cent., and in Indo-China there are further reports of an improved harvest. On the other hand, there will still be deficit areas in China, though the Korean yield may be as much as 15 per cent. up on 1947.

Fish Oils

In a reply in Parliament Mr. Strachey stated that about 500 tons of herring oil had been extracted in this country, the scheme being "still in the experimental stage" and not as yet yielding oil suitable for margarine. All of which reminds us how in the United States and Canada fish oils —as distinct from fish liver oils—have been produced for some years. Such oils, when extracted from whole fish like herrings, sardines, pilchards, and from offal from herring packers and salmon canners, are nearly always extracted when in large

quantities by the pressure process, with solvent extraction used for small batches. Fish oils rich in vitamin A have already been prepared from intestines of halibut and black cod. Recent heavy pilchard catches in Cornwall should provide an impetus to go beyond the experimental stage, for both the Atlantic and Pacific coasts of America have seen great yields from pilchards and herrings. In British Columbia, out of nearly 4 million gallons of fish oil produced annually before the war period, over 1,700,000 gallons were pilchard oil. Norway and Iceland are also responsible for smaller supplies when fish manure and oil are outlets for unsold fish. As for present and possible uses, here again the West shows the way with applications in edible shortenings, oilcloth, paints and varnishes, patent leather, lubricants, rust prevention, and minor possibilities in steel quenching, jute batching, and fish oil stearin preparation. Highest grades will undoubtedly find outlets in edible oil production; lowest grades with a high fatty acid content, will still be saleable in a world with ever-increasing demands for oils of all kinds.

Training Within Industry

Training systems aimed at the development of salesmanship were devised as long ago as 1938 by a Glasgow firm of bakers, caterers, and purveyors, by which assistants were to be trained to speak attractively, to approach the customer courteously and interest her in the products of the firm, to be given a background based on the firm's own history, thus giving each assistant a feeling of pride of achievement, and to be encouraged to regard selling as a career. These basic principles are still essential features of the scheme at present in operation.

Carefully scrutinised application forms are completed by recruits and on selection each girl is given a 10-14 day period of indoor training. During this period recruits are trained in the essentials of good salesmanship, window display, and other shop duties, including attendance at meetings and lectures during their employment with the company. Talks by technical and practical men from the bakery outlining such selling points as the qualities of the goods produced form a further useful feature of these meetings. Trainees are then sent to selected branches in the city where manageresses continue the tuition.

Should it become apparent that a recruit is not settling readily to shop work after completing her preliminary training, she may be transferred to some other section of the business such as bakery despatch, or chocolate and icing confectionery work.

Training is operated normally from September to May, wages being paid throughout this period, followed by a graduated scale of wages on starting shop or bakery work. This scheme has definitely demonstrated its merits, and although present conditions tend to lessen its immediate value, its long-term importance is fully realised and the policy framed accordingly.

Staphylococcus Food Poisoning

In a paper presented by Drs. Dorothy L. Hussmann and F. W. Tanner before the Food and Nutrition Section of the American Public Health Association at its seventy-fourth annual meeting on the relation of certain cooking procedures to staphylococcus food poisoning, a report on the study of one of the more practical aspects of the staphylococcus food intoxication problem was given. This was an attempt to establish thermal death time-temperature relationships for one strain of staphylococcus in cream filling and to correlate the results thus obtained with the temperatures attained in accepted cooking procedures for that article.

Bacteriological examination was made of cream filling subsequent to placing it in cream puff pastries. It appeared that information of such a nature might be of some help to public health officials who were interested in the requirements for cooking cream fillings, the reheating of pastries as a means of protecting the public against illness due to the ingestion of staphylococcus in cream filled products, and the part played by the food handler in the contamination of such products.

The multiple tube test was used, and one strain of *Staphylococcus aureus* was the test organism. Thermal death time determinations for the same organisms were also made at a range of temperatures, using a *p*H 7 phosphate buffer solution for the suspending medium. In the range of temperatures studied, *Staphylococcus aureus* Strain C12069 (Dolman) was found apparently to survive for thirty minutes at 55° C. and to be destroyed after less than three minutes' heating at 85° C. In phosphate buffer solution, *p*H 7, the organism survived somewhat less stringent heat treatment. It appeared that at the conclusion of such a cooking procedure, cream filling was free from viable staphylococcus.

Sulphite Liquors

An announcement that the Lake States Yeast Corporation is constructing at Rhinelander, Wis., a 400,000 dollar plant for producing yeast from sulphite liquors adds one further illustration of this striking source of protein from a trade waste. Both in Europe and in the West intensive research has brought utilisation of the 2 per cent. fermentable sugars in what would normally be an objectionable effluent polluting rivers. Alcohol and yeast have come from some mills after banishing the poisoning of yeast (due to sulphur dioxide traces) by cultivating more resistant strains. In Norway the inclusion of nutrients brought alcohol production to the high level of 91·2 litres per ton; in Canada baker's yeast is produced by neutralising, settling, and adding some molasses, malt, and nitrogen and phosphorus nutrients before aeration. By 1944 Germany had six plants for "sulphite yeast," with two others under construction, the former yielding 7,300 tons yeast annually, and the latter two calculated to produce a further 7,800 tons. Such yeast contains 1·6 per cent. more digestible protein than other concentrates for cattle rations. *Torula utilis* has occupied pride of place among favoured strains, with *Oidium lactis* a rival in the case of the Biosyn process which Germany adopted to yield a wet yeast for sausages and as a sandwich spread.

Food industries come into the picture in yet another utilisation of sulphite liquors, that is, in vanillin production. Conversion of lignin into vanillin is as simple as cellulose into glucose, with the vanillin grouping in the lignin structure. Lignin sulphonate is heated with caustic soda under pressure; then carbonated, after which solids are filtered off; and a benzol extraction in counter-current yields a crude vanillin to be distilled *in vacuo* and crystallised to yield the high standard of purity in final product and the aroma required in flavouring. With Canadian and American mills able to supply the world's demands for vanillin, this intermediate enters a new stage. Natural vanilla and vanillin from clove stem oil have met with competition, as Java, Madagascar, and Mexico will ultimately find. But there is still a preference in some cases for "100 per cent. from clove oil"; and, even more important, there is the prospect of vanillin becoming an invaluable intermediate in the organic field—one of many designed to make black sulphite liquor today what black stinking coal-tar has been for so long.

Sugar Review, 1947

Consumption of sugar in the United Kingdom during 1947 was the highest since pre-war days; nevertheless the nation's stocks increased substantially during the year.

The total consumption of sugar during the year was about 2,050,000 metric tons, 50,000 of which were due to the higher ration during September and October, according to statistics published by the International Sugar Council. This consumption has not been exceeded since 1938-1939, when 2,405,041 metric tons were used.

At the end of August, 1947, United Kingdom sugar stocks totalled 698,482 metric tons, of which 40,642 metric tons were home grown and 657,840 metric tons were imported. Comparable totals for January 1, 1947, January 1, 1946, and August 31, 1939, were 583,262, 550,799, and 312,637 metric tons respectively.

World stocks of sugar were about 511,000 metric tons higher at the end of December than at the beginning of the year. World production in 1947 was estimated at 25,381,000 metric tons, and world consumption at 24,870,000 metric tons.

United Kingdom exports of refined sugar in the year ended August, 1947, totalled 203,857 metric tons, the highest figure since 1938-1939, when 404,153 metric tons were exported.

Cuba, the world's principal sugar exporting country, exported 4,777,199 metric tons of sugar (raw value) in the year ended August, 1947, and held stocks at that date of 1,986,724 metric tons, compared with 1,357,256 metric tons a year earlier.

Fertilising the Sea

In 1947 we heard very little about a piece of marine research that had seemed to promise so much in 1945 and 1946—the stimulation of fish growth and fish population by adding fertilisers to Scottish lochs. Indeed, the work of Dr. Gross would have attracted considerably more attention had it not coincided with so many post-war "releases." Beginning in 1942, Dr. Gross and his University of Edinburgh colleagues proved first in an artificially dammed loch—Loch Craiglin—and later in an unenclosed tidal loch—Kyle Scotnish—that the addition of nitrogen and phosphates greatly expanded the production of plankton which in turn increased the development of fish.

These experiments were brilliantly successful. They not only proved what theoretical marine bio-

chemistry predicted about plankton production; they showed that quite low rates of fertiliser application—lower per acre than are used on many farms—could produce unexpectedly high gains.

The second series of experiments in the non-enclosed loch demonstrated the very important fact that tidal movement did not significantly disperse the fertiliser effects. The measured responses to these marine fertiliser applications were twofold and threefold increases in normal growth-rates; similar applications on land have rarely given yield improvements even approaching this standard.

We have heard little in 1947 about the next logical phase in this research—the attempt to apply the lesson of the lochs to a breeding-ground in the open sea. Internationally, no doubt, such an experiment would require considerable co-operation, and delay might be expected in preparing the necessary arrangements. But within our own territorial waters at least a pilot-scale experiment could be made. Silence on this subject is not encouraging, and it suggests that the work has not yet obtained the backing it deserves. With dangers of over-fishing so frequently stressed, this possible answer in terms of production rather than control and restriction cannot be soft-pedalled. It is known that plankton development follows seasonal surges because the nutrients in the surface waters are rapidly used up and cannot be renewed from deeper waters until temperature changes in spring and autumn re-mix the layers of the sea. It has been proved that nitrogen and phosphate additions will reinforce the sea's limited supplies.

This truly major advance in our knowledge should not be left to drift and wait even though many practical and economic difficulties may stand in the way of its full exploitation. It must be persistently pioneered, and preferably, so far as Europe is concerned, by the country whose coastal waters were the first home of the idea. Certainly it has been argued in some quarters that no large-scale development can be hoped for unless there are big advances in international fishing agreements; indeed, the fertiliser applications to the open sea would have to be internationally provided. But this is surely not an argument for a defeatist policy? The same high standards of international agreement are required for dealing effectively with the overfishing problem. Here is a most practical way in which Britain could lead Western Europe towards co-operative expansion.

With the world shortage of fertilisers for soils it is unlikely that any large-scale progress could be made for at least three years, but in those three years many of the further practical problems might be overcome. We hope that in 1948 we shall hear considerably more about the continuation of Dr. Gross's war-time work.

Life's Little Worries

Where food is concerned almost every day that passes brings either a grouse at table (an abstract one, of course), a grumble in the queue, or some other sign of grievance. Some are merely mild problems, to be as lightly pondered over as that of the gourmet in a London shop who had failed to get his quota of spirits during Christmas, and in surveying the "left-overs" from that festive season, was trying to figure out whether to buy pears in brandy at 50 shillings a bottle—and give away the pears! At the other extreme were those Liverpool dockers complaining they had a "sticky time" unloading 8,000 tons of dates, with the viscous juice oozing out of the bags making it a "dirty" cargo entitling them to special rates. In deciding to "strike" they did what Mr. Everyman thought of doing when called into the kitchen to deal with another sore problem. That was the problem of opening those cans of Portuguese sardines with no key-opener provided, with thick seams welded together in such a way that a pair of pliers, gripping dentist-like the tongue-flap of tin, merely succeeded in yielding a mangled can of jagged edges, a bleeding finger or two, and a squashed amorphous mass of fish.

And then to turn to a drink which, like tea, does not inebriate, while we applaud the gradual disappearance of S.D.I. labels in favour of our individual preferences in the soft drink world, our hearts go out to *The Times* correspondent who had to go thirsty so long. His grocer had rows of bottles of his favourite orange squash. But he refused to serve him unless the customer could bring the necessary empty one first—an impossible demand, or so it was thought, since the squash fan had only recently arrived in the country with passport but without the essential empty bottle. But the cry from the heart called forth the only response expected from free Britons: an inundation of empty bottles and telephoned offers, invitations to cocktail parties followed by presents of empty bottles, sundry advice inveigling him to "pinch one," and, best of all, several full bottles from an S.D.I out to ensure he never shall thirst.

The Confectionery Industry

Progress in 1947

R. L. KENNY, B.Sc., F.R.I.C.

Progress in the rehabilitation of the industry has been handicapped by the continued world shortage of essential food commodities, and also by the fact that the dollar resources of the country will not always permit the purchase of products which are more freely available. As a result, the industry has continued to bear all the marks of austerity and control, twin burdens which are likely to remain for some little time to come. Looking on the brighter side, however, perhaps the greatest single development has been in the export field.

DURING the last few years it has only been possible to export chocolate and sugar confectionery to programmed areas, which included certain British Colonial possessions, on a quota basis which permitted every manufacturer to despatch a certain maximum quantity to a particular locality.

The Export Drive

A recent change in Government policy has taken the broader view that export will be permitted to all hard and soft currency areas, provided that it can be proved that there is an adequate dollar margin on the export price of the finished article, as against the cost of importation of the requisite raw materials. Under this new scheme facilities have been made available to manufacturers for the replacement of almost any raw material utilised in the fabrication of their products, with the result that export business has been placed on a highly competitive basis in which quality has become a corner-stone of sales policy.

In order to assist this export drive, greater packaging facilities have been made available, with the result that it has been possible to introduce increased presentation into packaging. By contrast, the industry as a whole has been forced, during war years, to clothe its products for the home market in battledress, and as a consequence standards have become considerably low. Healthy export competition therefore is making the industry alive to the packaging problems which will confront it on the home market when supplies become more readily available.

Food Legislation

One of the difficulties encountered in the export sphere is the necessity for strict adherence to the requirements of food laws in the various countries, each of which has specific regulations. In the case of the United States these are most stringent and well defined. As an example, the utilisation of edible dyestuffs for the colouring of sugar confectionery may be quoted.

In this country a schedule of dyestuffs is laid down listing those colours which may not be added to articles of food. This schedule includes compounds of antimony, arsenic, cadmium, chromium, copper, mercury, and zinc, the vegetable colouring matter gamboge, and five specifically named coal-tar colours. Any colouring matter not listed in the above classification may be utilised.

In the United States, on the other hand, legislation operates on the principle that only those colours which are specifically mentioned in a schedule may be utilised, and the limit tests concerning impurities are extremely stringent. It is necessary, therefore, for manufacturers to utilise a special series of colours for United States export, and this point alone illustrates the care which is required in the composition and make-up of assortments destined for overseas.

All food products entering the United States are also liable to a series of micro-analytical tests, which have as their objective the isolation of any filth or rodent hairs.

Cocoa as a Source of Dollars

A shortage of cocoa has caused the price to rise sharply. The position has been rendered serious by the incidence of disease in the cocoa-growing areas, but this problem has been rigorously tackled by the Government, and although it will not be possible to show immediate results in this respect there is every hope of the trouble being reduced and finally eliminated over a period of years.

Of the present annual production of approxi-

mately 630,000 tons, well over half this quantity is in growing areas which are under British control. Britain has therefore found herself in the position of being able to sell cocoa direct to America at a price which has risen to more than ten times the pre-war value. As a result cocoa has now become one of Britain's best sources of dollars, and the Colonial Office has rendered every possible assistance in the research being carried out to eliminate disease.

In order to utilise to the best possible advantage the limited quantity of cocoa available, it has been necessary to reduce the cocoa and cocoa butter allocation to manufacturers for home production to 55 per cent. of their basic allocation. This restriction, coming at such a time after an adequate supply of cocoa had been available throughout the war years, was indeed a blow to the industry. In spite of this the domestic ration has still been maintained at 16 oz. per four-weekly period by the granting to the industry of an increased proportion of sugar.

Manufacturers have overcome these difficulties by a reduction in the number of lines which are entirely dependent upon chocolate, such as moulded tablets, and by concentration on the marketing of sugar confectionery and chocolate assortments.

Under normal circumstances a switch-over to the production of chocolate assortments would be a logical sequel to such a change, since the overall sugar content is higher than in moulded tablets, but the necessity for the utilisation of cartons for packaging such confectionery has retarded this development.

Packing Problems

As with all allied industries, the packaging problem has become even greater with the passage of time, and it has been necessary to reduce the allocations of board and paper available to the trade. At the same time certain restrictions have had to be imposed upon the packaging of specific lines, which have prevented the marketing of hard-boiled sugar confectionery in cardboard containers. Further, the packaging limits do not permit of the utilisation of metal containers of a size smaller than 7 lb., with the result that glass jars have been the only small pack available for this type of confectionery. This method of merchandising has its limitations, as in addition to the difficulty of obtaining adequate supplies of glassware, there is the further disadvantage that considerably more board is required in the utilisation of outers to afford adequate protection.

The internal presentation of chocolate assortments has always been associated with the employment of dark brown glacine paper for the fabrication of the crimped cups, but such material has been extremely difficult to obtain, and it has been necessary to use a white unwaxed paper as an alternative.

Effects of Climatic Conditions

The despatch of foodstuff to the four corners of the earth during the war for the use of the Armed Services has led to a great improvement in the type of containers utilised for protection against both humidity and infestation. This aspect of packaging is one which has required but scant attention on the home market during recent years, since the shortage of rationed goods has resulted in the immediate sale of all products.

Moisture-proof transparent film and allied packaging materials have been utilised for export purposes in the form of envelope wraps on chocolate boxes to prevent sugar bloom. Chocolate and confectionery suffer deleterious effects when exposed to adverse climatic conditions, and it is essential for manufacturers to be familiar with the average maximum temperatures and humidities experienced in any part of the globe during each month of the year. To some countries it is only possible to ship chocolate during the winter months when temperatures are such as to prolong the shelf life over a reasonable period of time. To obviate difficulties in this respect it was the practice of a number of manufacturers to produce an export chocolate in which a portion of the cocoa butter was replaced by a fat possessing a higher melting point. While such products withstand abnormal climatic conditions to a greater degree, they show a tendency to cling to the palate, and the eating texture is thereby impaired.

Deterioration through Heat

Although adequate measures can be taken to prevent the penetration of moisture into chocolate packs by efficient sealing, a greater problem is presented by deterioration through heat. Heat produces a grey discoloration on the surface of chocolate, which is due to the lower melting constituents of the cocoa butter rising to the surface, and crystallising in the form of minute particles. A considerable amount of time and research has been spent on the elimination of this problem over a period of years, and while a complete answer has not yet been found, the difficulty is partially overcome in this country by improved methods of cooling the chocolate after deposition, and by subsequent storage in air-conditioned stock rooms. The improved gloss and finish imparted to chocolate by variation in cooling methods is dependent upon the speed of crystallisation of the fat. In the design of modern enrobers, therefore, increased attention is paid to

the maintenance of automatic tempering of the chocolate before enrobing, and also to design and temperature of cooling tunnels. There must be an exact balance between the temperatures of the chocolate and the tunnel as well as between the time the chocolate-coated goods remain in the tunnel. For the highest gloss to be attained, the temperature of both the chocolate and the tunnel must be modified when the room temperature varies.

Raw Materials

The continued shortage of albumen has caused considerable delay in the reintroduction of such popular lines as the nougat and marshmallow type, and there does not appear to be any likelihood as yet of supplies of this commodity being freely available in spite of the small amount required by the trade in relation to the output.

Details of albumen substitutes which have been perfected to a marked degree on the Continent during the war have been made available to the industry in the form of B.I.O.S. reports. These substitutes depend upon the treatment of skimmed milk protein or whey with alkaline salts of calcium or phosphates during the evaporation process. While these compounds are reasonably satisfactory for the production of bakery specialities, the stability of the foam produced has been found suspect when whipped with high proportions of sugar, with the result that they are less suitable for the replacement of albumen in sugar confectionery. Work, however, is still progressing on the utilisation of these products, and it is possible that beneficial results may eventually be obtained.

Reference has already been made to the severe reduction in the cocoa and cocoa butter allocations to manufacturers during the year, and this has now been followed by a reduction in the sugar allocation, operating from January, 1948. The reduction will also apply to confectioners' glucose, which has remained in continuous short supply since the grain from which it is prepared has been required for other purposes. As a result of these cuts it has not been possible in the New Year to maintain the ration at 4 oz. per person each week, and a reduction has taken place. The production capacity thereby made available will have to be utilised by the acquisition of export markets, for which a target figure of 20,000 tons has been fixed for the industry for 1948. This figure is greatly in excess of any previous attempts in this direction, but its fulfilment will depend largely upon the policy of overseas Governments in permitting import licences for foodstuffs.

There is already a tendency on the part of certain countries of both hard and soft currency denominations to prohibit importation, with the result that manufacturers are constantly having to search for new markets and fresh opportunities.

One of the many difficulties which have arisen is the fact that, while a reasonable variety of auxiliary raw materials, such as nuts, is made available through allocation, the price is such that a careful watch must be kept on costings, should more than a small quantity be introduced into any particular confection.

The use of butter for caramel manufacture has practically ceased, and it has been replaced by deodorised cocoa butter, which is producing caramels of a less appetising nature. Nevertheless, it has supplied most of the texture requirements of this type of confectionery.

The Essential Oil Position

Many of the essential oils utilised by the industry have remained under control, with the result that a low price has been maintained, although the quality of some of the oils, particularly orange of Brazilian origin, has left much to be desired.

The system of allocation is a handicap to manufacturers anxious to maintain the highest possible quality, as no guarantee can be given concerning any particular batch imported into this country. In some cases the manufacturers have taken the precaution of having the oils redistilled before use, to ensure a certain amount of standardisation in this respect. This procedure has applied more particularly to peppermint oil.

Pure fruit concentrates which were in popular use for centre cream work before the war have now made their reappearance both from home sources and in the form of importations received from Holland. Very few manufacturers, however, have been able to take advantage of their availability, since the price of fresh fruit has risen so considerably that the utilisation of concentrates without fortification is uneconomic under the existing prices which are in operation for sugar confectionery.

Future Prospects

The outlook for the industry must essentially be bound up with the development of the cocoa crop in West Africa. The events of the last few years have made everyone concerned conscious of the potentialities of the correct growing and distribution of this commodity. Every care must be exercised in the future to ensure that cocoa is marketed according to a policy which will produce a fair return to the native grower, who on his part must be made fully aware of the danger from disease.

In this country manufacturers will look to the more efficient fumigation of cocoa, so that when long-term storage again becomes a necessity the degree of moth infestation may be minimised to the benefit of the industry as a whole.

Factory Engineering

DURING the past few years a number of books dealing with maintenance of plant, as well as with the installation of projected schemes, have been published, all useful to some extent, but many of which omit to refer to matters of serious importance to the factory maintenance engineer who is only too often so completely engaged in the repairs and maintenance of the power and processing plant that he has not the time to devote to efficient and economical production.

It is fortunately true that there exists a tendency for factory executives and works managers to give more encouragement to budding works engineers to get more technical training through technical schools and colleges than was the case twenty years ago. But all too frequently, technical knowledge is crammed into engineering students irrespective of whether they possess the necessary ability to apply that knowledge to practical advantage or not. It is obvious that the object of a works engineer's mechanical engineering training is to enable him to direct the carrying out of purely mechanical repairs and alterations to the plant under his control in the most reliable and economical way; at the same time making use of the available technical knowledge to ensure that when his directions have been carried out, the final result should not only be mechanical success, but also the most efficient and economical operation.

The foregoing remarks are prompted by the perusal of an excellent handbook* on engineering which should prove useful to works engineers, technical students, and works managers in charge of engineers. It will also be found helpful to the works engineer whose technical knowledge needs rubbing up, while there are many who are taking technical tuition who could make considerable use of the practical information given.

Obviously no one book can convey all the information required by the keen engineer whose responsibility is for the operation and maintenance of electric drive and process machinery which is made in so many forms and designs, but the clear explanation of the principles given in this book cannot fail to be helpful.

In the first chapter dealing with steam usage and objectives attainable, the subject is treated in an easily readable and understandable way, but the general usage of steam and methods of steam trapping, as well as the use of calorifiers and space heating by steam might have been covered in more detail.

The planning of a new installation, the distinctive colouring of lines to indicate different fluid contents and different pressures, dealt with in chapter 5, will be useful to the student.

Chapter 6 deals with the choice of steam-raising plant, and contains an account of the methods of firing the different fuels, providing a useful summary of the subject.

Other chapters treat of back pressure and extraction engines and turbines and steam accumulators, and the important subject of maintenance and efficiency of steam-raising and utilising plant.

The fundamental principles of electric power generation and explanations of the methods of maintenance are incorporated in chapter 10.

In a recent paper, Mr. James Black said that the main purpose of modern management was to raise productivity in the shortest possible time to the highest possible level and to maintain it at that level by obtaining the greatest possible output from both men and machinery without overtaxing either. The magnitude of this task will be appreciated when it is pointed out that we are a long way from being fully mechanised—in America the horse power available for use per head averages 6½; in this country it is 3½. The present-day shortage of fuel and materials makes the task even more difficult. The day has gone by when the maintenance engineer did no more than repair a fault. Conservatism and empiricism, which have retarded the rate of progress for so long, are nearly dead. Advanced engineers realise that the rate of progress could be accelerated by a more fundamental approach to their problem.

In the future, the maintenance engineer will co-operate more closely with the designer; he will learn how to keep technical records and how to use them. He will also endeavour to reduce to a minimum the number of production hours lost due to breakdowns, and he will not feel satisfied with himself if his whole team of maintenance personnel —staff, foremen, craftsmen, and labourers—have not worked as a happy team.

Any book that puts the elementary or advanced student in the way of attaining these ideals has achieved its object, and its perusal should infuse the student with a desire to safeguard heat units as has been the author's intention.

The book is well produced and the illustrations and graphs are clear. In the next edition its value might be enhanced by the inclusion of a bibliography. For instance, the author acknowledges in his preface the permission to reproduce illustrations and tables from the *Fuel Efficiency Bulletins* published by the Ministry of Fuel and Power, but it would have been useful had he included a list of these.

H. C. A.

* *Power and Process Steam Engineering.* By Douglas Copp, A.M.Inst.C.E., A.M.Inst.Gas E. Pp. 173. London. Price 15s. net.

Sunflower Oil

Erected in 1946 in Altona, 100 miles south of Winnipeg, for the purpose of increasing the supply of edible oils, the Co-op Vegetables Ltd. plant has reached a present-day output of 500,000 lb. of oil a month.

THE history of the plant, which in its first year of operations grossed nearly a million dollars, dates back to the days of World War II when allied shipping was at a premium and Canada's supply of edible oils from the Argentine was virtually cut off. The Dominion Government sent out a call to farmers for edible oils for an oil-hungry nation.

The farmers in the Altona district, the majority of whom are Mennonites, and long accustomed to growing sunflowers, were asked to step up their production of the plant, and instead of using it for feed and fuel to ship it to the oil extraction plant at Hamilton, Ontario, for processing.

Seeds fed from the elevator to the oil plant through connecting funnels are stored in a bin, below which is an automatic scale recording their weight before entering the dehuller.

After a couple of years of seeing the revenue from their produce being cut by too many steps before it reached the market, the farmers of Altona rebelled and decided to build their own plant despite an apparent lack of capital and seemingly overwhelming opposition.

Led by the Federation of Southern Manitoba Co-operatives, an institution already well founded in the district, a drive for the present plant was started. Officers were elected, committees set to work, and the co-operation of the farmers solicited. The idea caught on, and more than 1,000 farmers rallied to support the plan.

All invested what they could, buying shares with no more guarantee of returns on their investment than the faith they had in their own ability. Provincial government aid was also obtained.

Erection of the plant started in 1945, and by March of 1946 it was producing. The farmers intensified their production of

When the seeds have gone through the expeller the remaining seed meat, known as seed cake, is expelled from the machine looking like huge chunks of cooked orange peel.

The oil flows from the filter press into the scale tank where it is weighed and then piped to the outdoor storage tanks.

After the meal-cake has been pulverised it is sacked and carried to waiting box cars by means of a conveyor belt.

sunflowers, and scientific assistance from government agronomists was given to increase the acreage production.

Today the plant is operating twenty-four hours a day, seven days a week, and pours 62,000 pounds of oil into a tank car every four days. It employs thirty-four men who work on the shift system, and, most important of all, the entire revenue from the plant is going back into the community and is aiding greatly in stabilising the economic status of the farmers in the district.

A tank car takes on a load of oil. The plant fills a tank car every four days and each car carries 62,000 lb. of oil.

The oil from the plant is still under government control for distribution, although the plant is permitted to retain one day's production per month for local sale and consumption.

Two important by-products from the plant are the meal cake and the hulls of the seeds. The former is well established as a vitamin- and protein-rich feed used for cattle and chickens. Too rich to be used alone, it is mixed with other feeds, ground and packed in the plant and shipped to feed-retailers by rail, the ratio being about ten carloads of feed to nine

tank cars of oil. The meal cake is recognised by experts as the best known feed for young chicks.

The hulls, which constitute about 50 per cent. of the seeds, were a problem at first and were used only as a feed mixture. Recently, however, satisfactory attempts have been made to use them as a fuel, and it may not be long before sunflower briquets are well-known commodities. Laboratory tests have revealed that the hulls contain 1,005 more B.T.U.'s per pound than certain coal briquets, and all that remains now is to find a successful and economical method of pressing the hulls into convenient form for use in domestic grates.

The sunflower is not new to the Altona district. It was introduced there by some of the earliest settlers, the Mennonites, who had grown it for generations on the steppes of Southern Russia, their native land, and brought the seeds with them when they emigrated to Canada in 1870. Since then they have grown it without much thought of improving the strain or developing it for anything beyond domestic use.

Recent demands on the seeds for their oil content has brought them recognition and consequent development on government experimental farms and in their laboratories. The outstanding object is to increase the oil content of the seed, reduce the length of time it takes to mature, and decrease the length of the stock. At Altona the farmers are being urged to produce a new strain developed by the government farms in Saskatchewan. It is known as "Advance," and is a direct development from the original Mennonite seed.

It is estimated that it will take 35,000 acres of sunflowers to keep the plant at Altona operating twenty-four hours a day for 300 days a year. Last year there were 20,000 acres cultivated, and reports this year show that the goal of 35,000 acres may be reached this summer.

Photos: Courtesy Canadian Pacific Railway Company.

Refrigeration: Its Principles and Applications

THE largest and most extensive application of refrigeration is in, or connected with, those fields related to the handling and storage of foods, the technique of which leads into many varied aspects of scientific research. Food technology covers so many services that there are few subjects untouched, refrigeration in itself being a separate and distinct field of specialised engineering. When economy, nutrition, and marketability are considered, refrigeration is definitely one of the best means of preserving perishables. It is the function of refrigeration to spread out the period of consumption of all seasonally produced foods, whereby such foods are consumed and enjoyed out of season; and in the preservation, transport, and processing of foods it plays an increasingly important part.

The potentialities of the refrigeration industry appear to be limitless; its expansion has been rapid, and there is an increasing call for more practitioners to specialise in its application.

The principles of refrigeration involve careful study of the general laws of thermo-dynamics. The treatment of refrigerating theory is based on the properties of the various refrigerants, the choice of which is dependent on their thermo-dynamic, toxic, and inflammable properties. The fundamental theories relating to the transfer of heat must be clearly understood by all students of refrigeration. These cannot be fully explained in a small book* of sixty-nine pages, but the author touches briefly and concisely on the main principles, and describes with admirable directness the principal features of a refrigerating plant.

Useful adjuncts to this little book are the calculations and solutions at the end of each chapter, which serve to illustrate and impress the main points of the subject matter, and the student will have little difficulty in grasping the salient features of each of Mr. Collacott's short and progressive lectures.

As an aperitif to a more extensive study of the subject, Mr. Collacott's volume can be recommended. It has the rare merit of treating a big subject lightly but surely. It touches on industrial and domestic refrigeration, and in addition defines clearly and unmistakably the principles embodied in the scientific basis of this new industry.

Commencing with a general description of refrigerating systems, the reader is introduced to brines and refrigerants, given a short but detailed description of compressors and condensers, led to the interesting subject of expansion valves, and finally left somewhat breathless, but still clear-minded, in the midst of that all-important item of equipment, the evaporator.

The average textbook on refrigeration uses nearly as many words to introduce the subject as Mr. Collacott finds necessary to summarise and discuss its whole theory and general description. Mr. Collacott's book is definitely *multum in parvo*. It should be equally useful to the student beginning this important study as to the practised refrigerationist, who has forgotten what he learned and wishes to recapture the main elementals.

Despite the authorised economy standards, the production of the book is excellent.—A. E. M.

* *Refrigeration*. By R. A. Collacott, B.Sc., A.M.I.Mar.E. London. Pp. 69+v. Price 6s. net.

Fruit Syrup Preparation

It is well known that a synthetic anion exchange resin may be used for the removal of acids from solution, and recent experiments were made to test its efficacy in the preparation of clear low acid syrups from citrus juices. These tests, described in a paper delivered by Herbert C. Gore at the 112th meeting of the American Chemical Society, proved its superiority over neutralising bases such as sodium carbonate, which had to be used carefully to avoid the deleterious effects of local excesses, or calcium carbonate, which necessitated the re-filtering of the syrup to remove salts which continued to separate on standing.

The high cost of the resin, known as Amberlite IR-4B, which was used was offset by the fact that it could be easily regenerated for further use by steeping in 4 per cent. solution of sodium carbonate and subsequent rinsing with water.

In these tests the juice was mixed at room temperature with approximately 5 per cent. of the resin for about one hour, during which time the resin absorbed a large proportion of the titratable acids present. When the stirring ceased, the resin settled quickly and the juice was decanted, filtered, and evaporated to syrup in flat-bottom pans of aluminium or stainless steel heated over gas. Concentration up to approximately 70 per cent. solids resulted. The syrups thus obtained had a good flavour and were sweet, clear, and beautifully coloured. Syrups from grapefruit juices were also prepared by this method, but they possessed a bitter taste which was attributed to traces of naringen. The flavour of these syrups remained unchanged although they were stored for weeks at room temperature, but their colour darkened considerably unless they were stored at low temperature.

Details were given of a typical experiment carried out on the juice, obtained from California Valencia oranges by the use of an aluminium burr, and strained through cloth. Its Brix was 11·1 at 20° C. The yield of strained juice was 48·7 per cent. of the weight of the fruit. A lot of this juice weighing 1414 g. was mixed with 5 per cent. of air-dry Amberlite resin IR-4B and stirred at 24° C. for a total period of one and a quarter hours, using a small power-driven stirrer having a chromium-plated propeller. Samples were taken every fifteen minutes by dipping, pouring each sample on a screen surface, and analysing the strained juice for acidity and ascorbic acid content. Data thus obtained showed that nearly 80 per cent. of the titratable acid was absorbed during the seventy-five minutes' stirring with 5 per cent. of the resin, while less than 20 per cent. of the ascorbic acid was absorbed at the same time.

At the expiration of the time the juice was poured off, mixed with 2 per cent. of the Hyflo Super Cel, and filtered on a precoated filter in a Büchner funnel. After standing in a refrigerator overnight, the filtered juice, which had a pale greenish yellow colour, was analysed for acidity (found 0·1 of 1 per cent. of acid as citric per 100 ml.), and ascorbic acid (found 32·4 mg. per 100 ml. of ascorbic acid). It was then evaporated to syrup. The solids content of the syrup (by Brix Table from its specific gravity at 20/20) was 64·4. It contained 0·64 per cent. of acid as citric and 178 mg. per 100 g. of ascorbic acid. A substantial proportion of the original ascorbic acid thus appeared in the syrup. Similar results were obtained from tests with canned orange juice and grapefruit juice either fresh or canned.

These tests, it was claimed, proved the practicability of using an anion exchange resin for the removal of titratable acids from orange and grapefruit juices, an interesting process in that it would reveal further uses for citrus fruits.

The Tin Container Industry

A period of vast development in the British tin container industry is foreseen by the Tin Research Institute when the present shortages, due largely to the labour position in the tinplate rolling mills and to the strict curtailment of many forms of containers during the war to enable the industry to concentrate on the food pack, can be overcome. The increased consumption of tinplate by the container industry, now roughly 80 per cent. of the available supplies compared with some 50 per cent. pre-war, has been taken up by containers for basic foods.

Producing over 1,000 million processed food cans each year and over 600 million of other types of containers, the Metal Box Company accounts for over 50 per cent. of the entire British production of metal containers, which may be divided into two broad types—the standard food can known as "open top," and the "general line" consisting of miscellaneous metal boxes supplied in many designs for a variety of uses and industries.

Among the most recent developments in the industry is the Metal Box snap cover jam can which was described in Food Manufacture, **21**, 7, p. 308. The development of new can shapes has not received much attention, but research into this aspect of the industry is progressing. An important item linking tin with the quick freeze process is the composite container, part wax card and part tinplate, for frozen foods. The addition of tin ends to the wax card containers now used for frozen fruit and vegetables will give strength to the box and is likely to be used on a wide scale.

The Use of Scientific Instruments in Chemical Analysis

J. H. GLOVER, B.Sc., A.R.I.C.

PART V. REFRACTOMETRY

Many organic compounds are so similar in their behaviour as to be almost indistinguishable by chemical tests alone. The identification of such compounds is dependent upon the evaluation of certain physical constants, among which refractive index is particularly important. The purpose of this article is to give an outline of some of the methods for measuring this quantity.

IT is well known that light, when passing from one medium to another, suffers a degree of "bending" or refraction at the interface. This phenomenon is governed by Snell's Law of Refraction, which states:

$$R_1 \sin i = R_2 \sin r$$

Where R_1 and R_2 are the refractive indices of the two media (1 and 2), and angles i and r are the angles made by the light beam with the normal to the interface in media 1 and 2 respectively.

The angle i may assume any value between 0° and 90° and certain conditions will hold according to its value. If i is 0° then the incident beam will be normal to the interface, and Snell's Law takes the form: $R_1 \sin 0 = R_2 \sin r$, thus giving $\sin r = 0$. Hence no refraction results. If i is 90°, a condition known as "grazing incidence," then we may write:

$$R_1 \sin 90 = R_2 \sin r \therefore \sin r = \frac{R_1}{R_2}$$

Now if R_1 is greater than R_2, the value of sin r becomes greater than 1, thus at "grazing incidence" no light passes the interface but is all reflected back again into medium 1. This is known as total internal reflection, and the maximum value of i for light to pass into the other medium will be the one corresponding to a value of r of 90°.

If R_2 is greater than R_1, then sin r is less than 1 and the above conditions are reversed. Thus when light passes from a less refractive to a more refractive medium there is a maximum angle of refraction corresponding to an angle of incidence of 90°. This angle is termed the critical angle.

The refractive index of a medium is dependent upon temperature, wavelength of the light used, and, in the case of solutions, upon the concentration. The relation between refractive index and temperature is somewhat complex and varies for different substances. For most organic liquids a rise of 1° C. will cause a decrease in refractive index of 4 or 5 units in the fourth decimal place. The effect of differing wavelength also varies with different substances; for instance, at 20° C. benzene gives the following values:

1·4976 for red light (6563 Å),
and 1·5249 for violet light (4341 Å).

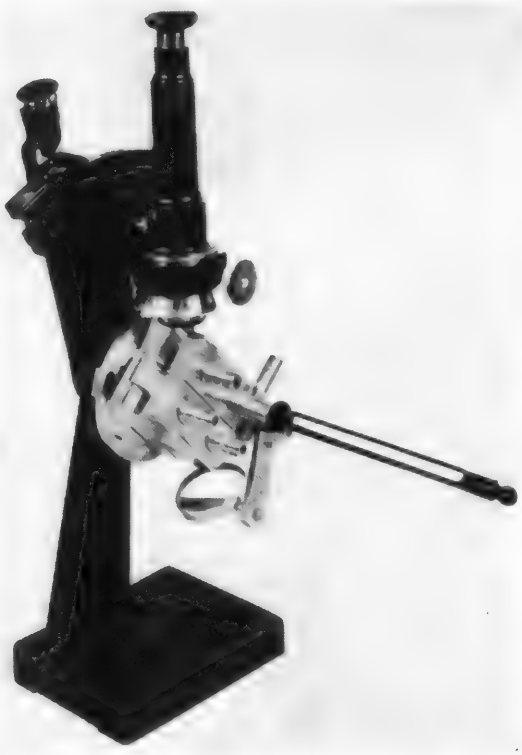
This difference in refractive index with different wavelength is known as optical dispersion. Dispersion is usually expressed as the difference in indices for two specified wavelengths, and is also used for the identification of compounds. It sometimes shows greater differences between similar compounds than does the refractive index.

Refractive index usually decreases with increasing wavelength, but when the sample shows any absorption characteristics maximum or minimum values may be obtained for the refractive index on or around the wavelength absorbed. This is known as "anomalous dispersion"; and coloured compounds usually exhibit the phenomenon in the visible region.

The effect of concentration on the refractive index of a solution is usually linear, and refractive index is used as a measure of the concentration of sugar solutions, including their commercial applications in jams. A calibration curve is usually employed for this purpose.

An expression of the refractive index of a substance is always made with reference to the wavelength of the light employed, and to the temperature at which the determination is made. These two factors are usually denoted by suffixes; thus R_D^{20} refers to the index at 20° C. with the sodium D line as a source of light.

Only two main types of refractometer will be dis-



The Abbé refractometer. *Courtesy Adam Hilger Ltd.*

cussed here, those depending upon the measurement of the critical angle, and an instrument which depends upon the measurement of angles of refraction for a certain fixed incidence angle. Space does not permit the description of instruments depending on light interference and other effects.

Critical angle instruments have, as the basis of their design, a prism of optical glass, of refractive index greater than the sample, so arranged that a thin layer of the material under test is in "optical contact" with one of its surfaces. Conditions of illumination are arranged so that some of the light strikes the interface between the sample and the prism at "grazing incidence." On viewing the light emerging from the prism a boundary corresponding to the critical angle of refraction will be seen to divide the field into bright and dark portions. The position of this boundary gives a measure of the critical angle and hence the refractive index of the sample.

The Pulfrich Refractometer

The Pulfrich refractometer employs a prism with a horizontal upper surface: liquid samples are placed in a suitable sample holder, which usually comprises a hollow cylinder with a ground base cemented to the upper prism surface so that this surface forms the bottom of the sample holder. A slightly convergent beam of monochromatic light is incident upon the interface between the sample and prism, and the boundary corresponding to the critical angle is viewed through a telescope which is fixed to a rotatable graduated circle. The position of the telescope and hence the angle of refraction is read off on the circle, which is graduated in angular degrees. A slow motion screw and vernier attachment enable accurate reading. Cross-hairs fitted in the telescope facilitate positioning of the critical boundary.

The simple form of Snell's Law has to be extended for the calculation of refractive index from angles measured on the Pulfrich, since the emergent beam suffers further refraction on passing from the prism into the air before entering the telescope. The equation employed is:

$$R_x = \sqrt{R^2_p - \sin^2 r_c}$$

Where R_x and R_p are the refractive indices of sample and prism respectively and r_c is the critical angle.

The Pulfrich refractometer is particularly suitable for the direct comparison of the refractive indices of two separate liquids. A special two-compartment sample holder is used, which must be carefully cemented to the prism surface. The choice of suitable cements for this purpose is an important question; this point, together with the subject of sample holders, is discussed by Weissberger.[1]

Limits of Accuracy

The accuracy of this instrument for absolute measurements of refractive index is 1×10^{-4} and an accuracy of 1×10^{-5} may be obtained in comparison measurements. For accuracy in the fourth decimal place the temperature must be controlled to within limits of 0·1° C. This is usually effected by the circulation of water at constant temperature through a jacket around the prism. The range of the instrument is dependent upon the refractive index of the prism, and usually extends to a value of about 1·85; it may also be used for dispersion measurements.

The refractive index of transparent solids may be determined on the Pulfrich refractometer. If a suitable sized piece of the material is available it is ground and polished so that it has two faces perpendicular to each other. The flattest of these is placed on the upper surface of the prism, optical contact with the prism is made by a thin layer of some highly refractive liquid such as mono-bromnaphthalene. The emergent critical angle is then measured in the same way as for liquids. The re-

fracting effect of the contact liquid cancels itself out at two interfaces, *i.e.*:

At the first interface:

$$R_x \sin i = R_l \sin r_l$$

and at the second interface:

$$R_l \sin r_l = R_p \sin r_2$$

$$\text{Thus } R_x \sin i = R_p \sin r_2$$

Where R_x, R_l, and R_p are the refractive indices of the sample, contact liquid, and prism respectively.

It should be noted that this is only true if the two interfaces are parallel, and to help to ensure this the minimum amount of contact fluid should be used.

The determination of the refractive index of powders on the Pulfrich refractometer is accomplished by mixing the sample with a liquid of higher refractive index in the sample holder, and then a liquid of lower index is added, with suitable stirring, until a broad band of light is observable at a certain position of the telescope. With further very small additions a sharp critical boundary is observed when the refractive index of the liquid is identical with that of the powder. Suitable liquids for use in this method are described by Kaiser and Parrish.[2]

The Abbé Refractometer

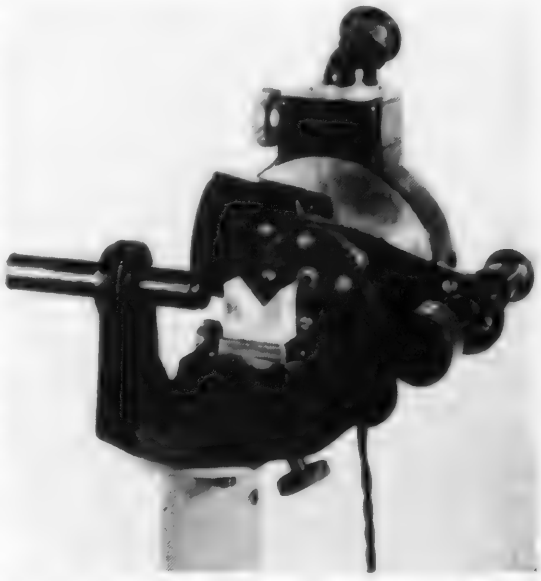
The Abbé refractometer is also based on critical angle measurements; its accuracy is slightly less than that of the Pulfrich, but it has the advantage that only a very small amount of sample is necessary. This instrument employs two prisms which are hinged together, a thin layer of the sample being held between them. The prisms are so mounted that they may be rotated, and movement of a reference arm along a sector scale accompanies this rotation. The telescope is mounted directly above the prism system, and this is fitted with cross-hairs for the accurate observation of the critical boundary. A mirror mounted below the prism system is used for illumination. The reference arm carries a reference mark which is engraved on a plate flush with the scale, and a lens is situated above for the easier observance of scale readings. The sector scale is graduated directly in refractive index, the intervals being computed from the angle and refractive index of the prism. The prisms are jacketed to allow temperature control, and the bottom prism is removable for the examination of solid samples.

White light is used with the Abbé refractometer, but the refractive index is obtained for the sodium D line. Normally, if white light were used, the critical boundary would be spread out into a spectrum due to the dispersion of the prisms and the sample. This dispersion is compensated in the Abbé by the introduction of two prisms. These are mounted one above the other above the prism system and are geared together so that they may be rotated in opposite directions by turning a milled head.

The prisms are so constructed that the D line is not deviated, but that a dispersion equal and opposite to that of the sample may be obtained on their rotation. In practice the critical boundary is observed and the compensating prisms are rotated until any trace of colour at the boundary disappears and a sharp achromatic edge is produced. The rotation of the compensator prisms may then be read off on a scale, and from this reading a measure of the dispersion of the sample may be obtained.

Butterfat Measurement

A simple modification of the Abbé refractometer is the Zeiss Butyro refractometer. This, as its name implies, finds application in the measurement of butterfat and related oils. It consists of a pair of jacketed Abbé prisms and a telescope which is fixed in relation to these. A scale is incorporated in the telescope eyepiece upon which the position of the critical boundary is read off. This instrument has fixed compensation for dispersion and for this reason is only suitable for fats. Tables are published relating butyro readings to refractive index. A standard oil may be obtained with which the instrument should be periodically checked.



The Hilger-Chance refractometer, showing details of the V-block, with the viewing telescope on the right.
Courtesy Adam Hilger Ltd

The Dipping Refractometer

A convenient and accurate instrument for measuring the refractive index of solutions in bulk is the dipping refractometer. Its main application is in sugar analysis, and it is a similar instrument to the Abbé, based as it is upon critical angle measurement. The instrument carries a prism which is dipped into the solution to be measured. Illumination is provided from below, and the solution is contained in a beaker in a water bath. The instrument measures the critical boundary upon a scale contained in the eyepiece. Interchangeable prisms give a range of refractive indices from 1·32 to 1·54. The arbitrary scale of the instrument is graduated in equal divisions from -5 to 105 and readings can be made to one-tenth division by means of a micrometer drum. It is necessary to make conversions from the scale reading to refractive index by means of tables supplied by the makers. It is important to check the zero frequently in this and other instruments, and also to check readings by the use of standard test plates, solutions, or standard refractometer oils.

A recent development in refractometers is of the second type and is the Hilger-Chance refractometer. This instrument was originally designed for measurement of refractive index and dispersion of optical glass, but has been later adapted as an accurate instrument for liquids. An accuracy of 1×10^{-5} can be obtained in the measurement of solids.

The main feature of the instrument consists of two glass prisms, accurately worked and united by heat treatment to form a V-shaped block of glass. The V recess has an angle of 90° and the material to be tested is placed in this V. If the sample is a solid, *e.g.* a glass, it is shaped to a right-angle prism and fitted into the recess with a suitable contact fluid. With a liquid sample, V-blocks with fused-on sides may be obtained which form a cell for the sample. Light from the desired monochromatic source is condensed upon a slit in a small collimator and passes into the V-block, where it suffers refraction by the sample. The angle of emergence is then measured on a scale by a rotating telescope as in the Pulfrich instrument. The collimator slit carries a fine line which accurately bisects the width of the slit, and settings of the telescope upon this line can be made with greater accuracy than can settings upon a boundary between light and darkness. The field of view of the Hilger-Chance instrument consists of a fairly wide band of light with a fine dark line bisecting it.

This instrument offers several advantages over the Pulfrich and the Abbé, since, owing to the fact that the critical angle principle is not employed, it is unnecessary to use a prism of higher refractive index than that of the sample. This enables a wide range of refractive indices to be measured, and also permits the use of a hard resistant glass for the V-block. The angles of the V-block are worked with sufficient accuracy to permit the calculation of refractive index from the angle of emergence without corrections to the theoretical formula. Also errors due to surface phenomena in critical angle measurements are eliminated in this instrument.

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[1] Weissberger, *Physical Methods of Organic Chemistry*, 1, 793.

[2] Kaiser and Parrish, *Industrial and Engineering Chemistry*, Analytical Edition, **11**, 560 (1939).

Handling and Transport of Meat

REPRESENTATIVES of the Sanitary Inspectors' Association, in response to an invitation from the Ministries of Food and Transport, met their administrative and technical officers and those of Meat Transport Organisation, Ltd., last year to discuss the general question of securing cleanliness in the handling and transport of meat. The main object of the discussion was to raise the standard of hygiene as soon as practicable at those centres where improvements are necessary to a level beyond any reasonable criticism.

The meeting was held under the chairmanship of Mr. C. L. Huntingford of the Ministry of Food, and the representatives of the Association were Mr. Stewart Swift, Mr. H. T. Perry, and Mr. A. Tyler.

It was emphasised that both the Ministry of Food and the Ministry of Transport were anxious to see the ultimate achievement of a high standard of hygiene in the handling and transport of meat. Unfortunately, the present supply condition precluded the possibility of any nation-wide plan for the scrapping and replacement of all but the best types of vehicles. The type of replacement vehicle and the ways and means of making the best use of existing vehicles were, however, matters for immediate consideration. It was also time to make some progress in formulating ideas as to the ideal arrangements to be aimed at as a long-term policy.

The representatives of the Association made it clear that the first requisite in ensuring proper transport of meat was that it should be in a fit condition to travel. Under present conditions meat was sometimes delivered to the carriers before it had time to set. The opinion was also firmly held that any meat-carrying vehicle not provided with gear for hanging home-killed meat must fall short of the ideal, but they agreed that no serious objection could be brought against stacking as a short-term alternative to hanging, provided that the meat to

be carried was properly cooled before loading, the stacking carried out skilfully, and the depth of stacking limited to avoid too great a pressure on the meat at the bottom.

The representatives of Meat Transport Organisation, Ltd., said that there were many difficulties attached to the design of a small vehicle capable of carrying beef hanging because of the great weight that would have to be slung from the roof. It was suggested that hanging was not the only solution to present problems, and that the main objections to stacking could be overcome by the use of a new design of vehicle of which a prototype was at present under consideration.

The chairman, replying to the various points that had been raised, said that it was the policy of the Ministry of Food that every advantage should be taken to improve the meat distribution arrangements from all points of view. The overloading of vehicles had already received the Ministry's attention, and instructions had been given that overloading was to be avoided even at the expense of extra journeys.

Consultants in Industry

WHILE the advice of consultants on difficult technical questions in industry is readily solicited, there is a marked disinclination among manufacturing concerns to enlist the services of consultants acting in the sphere of organisation and general management. The enlisting of such help seems to be regarded as an admission of failure and incompetence on the part of the management, and firms are most unwilling to admit any imperfections in the non-technical side of their business.

Occupation with short-period control often means that firms are unable to concentrate on long-term re-organisation, which fact is itself an argument for procuring the advice of a consultant. Maladjustments are bound to arise as a consequence of the normal growth of a business and changing external conditions, and as such difficulties often cannot be tackled as they arise, they eventually create a position which requires handling by an outside agency with experience of such situations.

The industrial consultant has a fuller function than the reorganisation of a business, however, for he can be called upon to assist in the initiation of new schemes, such as a system of payment by results, and similar projects. He has the advantage of experience in such innovations elsewhere, and can therefore formulate a plan of action which will avoid mistakes and delays in the early stages of the scheme. In addition, he can train members of the staff to continue the working of the project when he himself has left. Many such schemes are best handled by an outside agent who has the knowledge of comparable schemes in other concerns, and who can promote their smooth execution with a minimum of conflict among the staff concerned.

It is commonly recognised that businesses tend to stagnate, and a time inevitably comes when a reform is needed in the organisation of the production unit. In some cases the necessary remedial steps are delayed by unco-operative individuals offering resistance to any sort of change, while some firms remain quite unaware of the need for reform, the effect of such a need on production costs being hidden by short-term changes. A periodic overhaul of the production unit is therefore desirable, and the industrial consultant is particularly qualified for such work, coming as he does with an open mind and a knowledge of techniques and costs existing elsewhere as a basis for comparison. In most cases his comprehensive report is likely to be studied with care, and may be the means of implementing suggestions which have been mooted for years and giving new life to a business.

The consultant also performs a useful function in analysing a particular weakness in organisation which has been noticed, but although the consultant can in this case depend on a sympathetic hearing from the management, the latter are all too often obsessed with the idea that however well schemes may have worked elsewhere, their particular business is "different." This sentiment may quite likely be the cause of much of the weakness in British management mentioned by Lord Leverhulme during his visit to Stockholm as head of the British delegation to the International Management Congress.

It is recognised that the tone of an organisation, and therefore its effectiveness, reflect the attitude of the management, and established British industrial consultants, setting themselves as they do the highest standards in their work of expounding the best methods of management, represent a valuable asset to the country. Their educative influence on workers, foremen, and managers with whom they come into contact remains long after they themselves have gone, and it is they who can most directly influence those managers who tend to lag behind the best British management standards.—(*Abstracted from "Times Review of Industry."*)

TO AUTHORS

FOOD MANUFACTURE is prepared to consider the publication of any books on scientific and technical subjects which authors might care to submit.

Food Industries and the Postage Stamp

ERIC LORRAINE ADLEM

Postage stamp designers in all parts of the world have drawn attention to the importance of food industries through the medium of the postage stamp. This is a point often overlooked by those engaged in the manufacture and distribution of foodstuffs, and although it is not possible to mention every design of this nature issued by the various postal authorities, the representative selection illustrated here will give a slight indication of the wide range of specimens which exists in this particular field.

THE British Empire has played a prominent part in postal publicity in much the same way as the foreign countries, and new designs continue to be issued from various parts of the globe.

Sugar Industry Designs

The sugar industry is undoubtedly the main branch to be recognised on postage stamps, and the outstanding specimens in this respect have been provided by British Guiana on the current 24 cents (green) value, showing sugar canes in punts; the current 1s. (brown and green) denomination of Jamaica, depicting the gathering of sugar canes, with a sugar factory in the background; and the first seven values of the 1928-1940 series of Guadeloupe, of which the 15 cents (red and black) denomination is reproduced on this page, portraying the interior of a sugar refinery.

The current 5 cents (blue and violet) value of British Honduras provides a well-drawn scene of native workers gathering grapefruit, an important industry in this particular colony.

Cheese and Butter

In 1946 Switzerland issued an attractive stamp to illustrate cheese making, and this design, featured on the 5 cents (green and red) value, provides a scene of workers engaged in the manufacture of one of the leading products connected with the country.

Another issue of note is that of New Zealand's 1d. (red) denomination, issued as one of a set commemorating the Empire Chamber of Commerce Conference held at Wellington in October, 1936. This stamp design provides an excellent little picture of butter being packed for export at one of the large packing centres in the Dominion.

Cost Accounting in the Food Industry

HARRY DUGDALE, A.L.A.A., A.C.W.A.

Part II

In certain food manufacturing industries the cost of labour is an important constituent element of total cost. Especially is this so in the case of packing operations. Accurate labour cost accounting demands, therefore, careful organisation and control of all labour operations.

THE cost of time expended on labour is ascertained by the use of electrical time-recording clocks. These are already in operation in a number of food manufacturing concerns; but, for the benefit of those who have not yet adopted this effective tool for time-control, a brief description is here given.

Time Recording Apparatus

One type of time-recorder in current use comprises a clock which is augmented by appropriate mechanism for time-stamping cards placed in a fissure of the clock. A time-card must be issued to each employee every week. This card is printed to show days of the week, each section being subdivided into morning and afternoon (or evening and morning in the case of night-workers). All cards are placed in a rack, adjacent to the time-clock, marked "Out"; on the opposite side is a rack marked "In." On entering the factory the employee selects the appropriate card from the "Out" rack, places the card in the recording-clock, and depresses a handle (in some of the latest time-recorders the action is automatic). This imprints on the card the actual time shown by the clock. The card is then placed in the "In" rack. By this procedure the *total elapsed time* from entering to leaving the factory is ascertainable; cards still in the "Out" rack at commencing-time indicate workers who have not yet arrived; the clock mechanism indicates, on the cards of late-comers, the fact of their late arrival; and overtime is also specifically shown. In the case of time-workers, *i.e.* those employees paid on time as distinct from piece-rates, it is possible to compute and extend on each card the gross wages from the aggregate clock-card hours.

A point of some importance concerns the positioning of the time-recording clock. Many concerns are content to have the recording-clock situated adjacent to the entrance gates of the factory, thus relying on the workers' conscientiousness impelling them to reach their respective departments without delay. On the other hand, the author has seen instances where the recording-clocks have been installed in each specific department, thus ensuring that employees are in their departments at commencing-time. It will be readily apparent that a few minutes lost between factory gate and department can become a factor of some magnitude where 1,000 or more employees are engaged in the factory's operations.

In organising labour cost accounting it is essential to "break down" the labour force into departments, and, where there are two or more distinct operations within a department, then subdivision of the departmental labour cost must ensue as a means of cost control. In all cases indirect labour must be segregated from direct labour. Indirect labour is that which, not employed directly in the food manufacturing processes, is yet ancillary but strictly necessary to service production. For example, indirect labour comprises plant maintenance engineers, canteen employees, departmental foremen, timekeepers, storekeepers (although this latter charge is alternatively recovered as material handling by a percentage on the cost of material issued to processes). Indirect labour is a form of factory overhead which shows a tendency to increase if not carefully scrutinised at short intervals.

Thus far the organisation of labour recording has dealt with the following aspects of the subject:

1. The departmentalisation and subdivision of departments of the factory.
2. The segregation of direct and indirect labour.

Classification of Factory Processes

The next stage is the classification of factory processes. This principle of classification is of great importance in the securing of cost data, and if actuated on the "standing order number" basis eradicates the need for written descriptions of processes and jobs. When all processes have been scheduled, along with data of the various products passing through such processes, a distinguishing number may be assigned to each, and this number is henceforth used on time-sheets, production re-

cords, materials' requisitions, and other costing documents. To ensure that such standing order numbers are fully comprehensive it is desirable to schedule in addition the various items of plant; by this procedure plant repairs and maintenance can be costed under the appropriate S/O (*i.e.* standing order) numbers. A copy of the S/O schedule should be exhibited in each department to ensure that all labour and materials' charges are properly classified.

Costing Systems

Employees' time on manufacturing, packing, and maintenance operations is normally recorded in modern costing systems on time-sheets or on other forms of recording-clock cards. Where the latter method is used each employee records the time spent by him, in his occupational capacity, on clock cards operated in the manner already described. In these circumstances, however, there will be a time-recording clock in each department, and the various classes of job or process will be indicated on each card. Alternatively, excellent results in labour cost compilation may be obtained by the use of time-sheets, ruled to meet specific circumstances, as in the example below.

As many food manufacturing concerns have of necessity to sell their products in a packed state, it is usual for teams of operatives to be employed on, for example, the packing operations. Where a team of workers is thus employed the necessity for a time-sheet for each individual employee comprised in the team will not arise; instead, a composite time-sheet for the whole team may be employed, the only point of difference being that the clock numbers of all the employees will be recorded on the one time-sheet. If the factory processing is being controlled on the production order basis the revelant production order number will be cited on the time-sheets as the work proceeds through the factory. It may be stated at this juncture that the costing methods employed will be normally batch costing or output costing; or, if the most modern management control methods are adopted standard costs. The latter will be outlined in a later article. Batch costing or output costing will respectively provide historical costs (*i.e.* costs gathered after the event) of a defined batch and unit costs of the output of each process. Standard costs, on the other hand, are scientifically predetermined costs.

Time-sheets are forwarded to the Cost Accountant's department each week. There they are analysed to the respective standing order numbers involved, this procedure providing the labour cost of each production order, analysed under processes and/or operations. At this point it is important that a reconciliation be effected between

(*a*) The total clock-card hours (*i.e.* hours of elapsed time between an employee's entering and leaving the factory); and

(*b*) The total hours shown by an aggregation of individual and "team" time-sheets.

Such a reconciliation ensures, initially, that all time spent in the factory has been accounted for.

Computation of Wages

The costing procedure must be so organised that the gross wages of each operative may be readily computed. As previously mentioned, the computation of wages paid on time bases is relatively simple and can be performed on the actual clock-cards. Where piece-work remuneration supervenes, however, the time-sheets must show not merely the times involved in the various processes but also the units processed or manufactured. Obviously these latter must be verified, by actual inspection, to ensure that proper piece-work remuneration is being computed, that processing losses are effectively revealed, and that adequate stock-control is maintained. A suitably ruled time-sheet enables piece-work remuneration to be quickly calculated from the data shown thereon, and will obviate the necessity of transferring hours from time-sheets to wage-sheets, an operation in which errors can easily

A TYPICAL TIME-SHEET

NAME. CLOCK NUMBER. DEPARTMENT.

Day.	*S/O Number of Work Involved.*	*Units Processed.*	*From* a.m. p.m.	*To* a.m. p.m.	*Equivalent Hours.*	*Overtime Hours.*	*Total Hours.*
MONDAY							
TUESDAY							
WEDNESDAY							
THURSDAY							
FRIDAY							
SATURDAY							
SUNDAY							

(N.B.—Computation of wages can be performed on the reverse side.)

arise. An initial rough idea of the tempo of manufacture can be obtained by comparing departmental weekly hours with departmental output.

The computation and payment of wages is normally one of the responsibilities of the Cost Accountant's department, and in a large factory every aid to speed which can be relied on to preserve accuracy should be resorted to in this connexion. Since the inception of P.A.Y.E. in April, 1944, the added work of computing and deducting tax has had to be organised. Hence the benefits accruing from mechanised methods of pay-roll preparation should not be overlooked. Those fortunate enough to possess accounting machines of the ledger-posting or punched-card types will not have failed to mechanise their pay-roll methods. In addition, where an extensive pay-roll has to be handled each week, the utility of coin-sorting and counting machines should be fully considered, these being effective time-savers.

Adequate methods of internal check should be instituted to control the operations of wages clerks, *e.g.* one section of the wages-sheets may be computed by Brown, checked by Black, and paid by Smith. Each wages-sheet should be separately added, and the page totals carried to a final summary sheet. Obviously the various final totals of gross wages and of deductions must be cross-cast to establish over-all accuracy; and a scheme of internal audit can usefully include the operation of checking, at monthly intervals, the employees' insurance cards against the names shown on the wages-sheets to safeguard the company from the introduction of "dummy" names on the pay-roll.

Gas-Stored Fish

It has long been recognised that long-distance transportation of "chilled" (unfrozen) meat has been practical in an atmosphere containing 10 per cent. of carbon dioxide, and that fish spoilage could be markedly delayed when stored in carbon dioxide gas, the optimum concentration of the gas being from 40 per cent. to 60 per cent. without affecting its flavour, but texture and appearance are adversely affected. The flesh becomes bleached and somewhat "friable," probably because the gas makes it slightly more acidic. Both unfrozen and frozen cured pork (bacon) has been stored experimentally without appreciable rancidity developing in an atmosphere containing 99 per cent. to 100 per cent. of carbon dioxide, and also without any apparent adverse effect on flavour.

Experiments on this problem were carried out by Dr. L. H. A. Tarr of the Fisheries Research Board of Canada.

Preliminary tests indicated that the onset of rancidity in flesh of fatty fish such as herring, black cod (sablefish), and salmon could be also entirely prevented if it was stored in the frozen state in the presence of a very high concentration of carbon dioxide or nitrogen gas.

Fillets were unbrined or brined, the latter by immersing for one minute in brine of 35° salometer strength at 35° F. to 40° F., and then wrapped after draining for about five minutes. Half the fillets from each fish were wrapped individually in "M.S.T." (moisture-proof, self-sealing, transparent) Cellophane. Both unbrined and brined fillets were packed into 5 lb. standard waxed fillet cartons. After freezing for three hours and overnight storage at about −25° F., they were subjected to the following treatments.

Cartons were inserted in a large cast aluminium pressure cooker with all but 0·1 per cent. of the air pumped out. Carbon dioxide gas was then run in until a positive pressure of approximately 2 lb. per square inch resulted. These gas pressures were maintained by the gas-tight containers. Cartons were also stored in air as controls.

After forty days' storage the containers were carefully examined. The air-stored samples (controls) all had a definitely rancid flavour. The nitrogen-stored fillets did not taste rancid and the flavour was very good. The fillets treated with carbon dioxide did not taste rancid, but they all had a more or less pronounced "off" flavour. Fillets treated with carbon dioxide without previous exposure to vacuum had a slightly rancid flavour, and all had the "off" flavour referred to above, doubtless because of the small amounts of air remaining in the containers not exposed to a vacuum.

In conclusion, containers should be used absolutely impervious to the gas employed, which is difficult in practice.

Experiments are at present being carried out in order to examine thoroughly the method of ice glazing and antioxidant glazes, to retard rancidity and desiccation. (*Mod. Refrig.*)

FOOD MANUFACTURE INDEX

The 1947 Index of Food Manufacture is now available. Will subscribers in the U.K. requiring the Index send a stamped addressed envelope, measuring 10 in. by 8 in., if they wish to receive it flat. In the case of subscribers abroad, the envelope need not be stamped. In all cases applications should be addressed to the Subscription Department, Food Manufacture, 17, Stratford Place, London, W.1. *Early application is advised.*

Potential Food Resources in Eire

THE illusion of illimitable supplies which existed before the war among the great urban and industrial populations has been shattered by the present calamity of food shortage over most of the world, and it is now recognised that never in human history has there been enough food for all the people.

Investigations in many countries have shown the extreme degree of malnutrition existing in large sections of populations of even the most economically developed countries. Only about 11 per cent. of the earth's surface is food producing, which amounts to about 2 acres per head of the population, and periodic gluts in one area are counterbalanced by starvation in another. The margin of security for human food, therefore, taking the earth as a whole, is very narrow indeed if the whole of the population is to have adequate nutrition within a measurable time.

The Menace of Soil Erosion

It would, of course, be possible greatly to enhance soil fertility and thereby increase food output if rational methods of land utilisation were generally practised, but, in fact, most of the land all over the world is being depleted in fertility and ravaged by soil erosion. "Cheap food" is dearly bought if, as has so often happened in the past, the producer has been constrained to sell not only the food, but the fertility of the soil which produced it in order to eke out a meagre existence. One very important factor in the question of food prices is the fact that all over the world modern transport has to a large extent broken down the isolation between the farm and the urban and industrial centres, and it is not a rash prophecy to suggest that in the future it will be increasingly difficult to maintain enough people on the land for maximum food production unless they can enjoy the advantages and opportunities open to dwellers in the cities and industrial centres.

Eire needs Industrial Products

But apart from the problems of the rest of the world, adjustment of the relationships of production and distribution between Great Britain and Ireland, whose economies are so complementary, should be comparatively simple, writes Dr. Henry Kennedy, Secretary of the Irish Agricultural Organisation Society in the Irish Supplement of the *Advertisers' Weekly*. In Britain food is likely to be a main preoccupation for many a day, while Ireland needs a great variety of industrial products which Britain can supply, and in the present circumstances it would be of the greatest advantage to have the possibilities of mutual trade fully and objectively examined. "Export or expire" is largely true of both countries.

The area of agricultural land in Eire is approximately 11·6 million acres. In pre-war years about 1½ million acres were under cultivated crops, the rest being pasture and meadowland. During the war, and since, the crop acreage has increased to almost 2½ million acres, under considerable difficulties arising from shortage of fertilisers and machines. In normal conditions crop yields are relatively high. Pasture output is high in certain well-known districts, but generally falls far below what modern technique has made possible. Indeed, much of the pastureland is in very poor condition, yielding only a fraction of what is possible. The easiest way to effect a spectacular increase in production is by concentration on the pasturelands. It would be relatively easy to double the output in food units of Ireland's grasslands, which would result in still greater increase in the output of meat and milk. The land needs more capital outlay, and this would be forthcoming if the uncertainties of the pre-war period were removed so that the farmer would feel confident that his greater efforts and commitments would result in a higher income. There is also needed a wider dissemination of modern "know-how" in the production, management, and utilisation of grass, and more research facilities.

Milk and Beef Production

The scope for development of milk and beef production in Eire can be realised from the consideration that the enormous exports of dairy products from New Zealand, amounting in 1942 to more than 117,000 tons of butter and 134,000 tons of cheese were produced on an area of less than 90 per cent. of the agricultural area of the province of Munster, and there is little doubt that comparable results could be obtained in Eire, while better pastures in the non-dairying districts would permit of an enormous increase in the production of beef and store cattle. The increased output of pig and poultry products is dependent on the availability of more concentrated foods, and an increased dairying industry would make available greater quantities of separated milk, the ideal protein basis for the nutrition of pigs and poultry.

The nature of farming is such that adjustments directed to high production necessarily take time, but there can, however, be no doubt whatever that there is a potential of enormously increased agricultural output in Eire, and that it is to the advantage of the two countries that it should be fully utilised.

Britain's Food Supplies

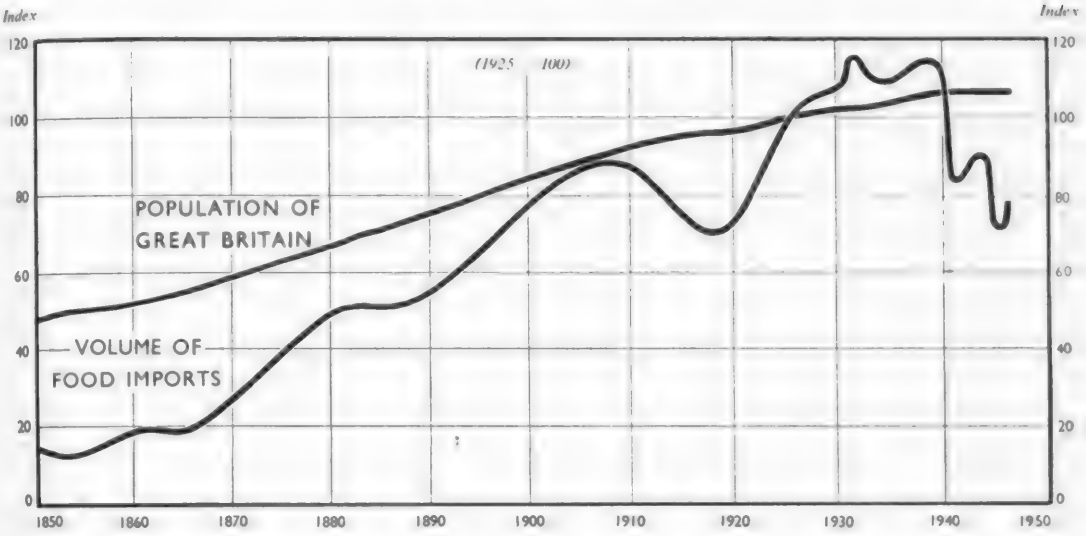


Fig. 1.—Population and food imports.

Before 1800, Britain was self-sufficient in staple foods, but in the nineteenth century population ran ahead of the home-grown food supply, and Britain became increasingly dependent on imported food.

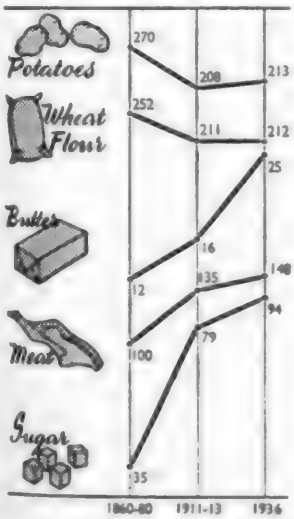


Fig. 2.—Consumption in lb. per head per annum.

WHILE the population in the 1930's was nearly double that of 1860, the nation did not require twice as much of the same types of foodstuffs. The higher standard of living demanded a more varied and better diet. The changes in consumption of some of the more important foods are shown in Fig. 2, and changes in the amounts imported are depicted in Fig. 3. In the latter half of the last century, wheat imports increased with the development of the new wheat lands, first in America, and later in Canada, Argentina, and Australia, but with the discovery of the means of refrigeration there came an even more rapid expansion in the imports of meat and butter.

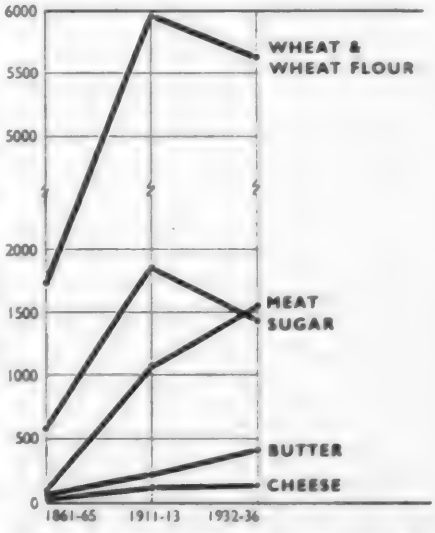


Fig. 3.—Annual average imports into the U.K. (thousand tons).

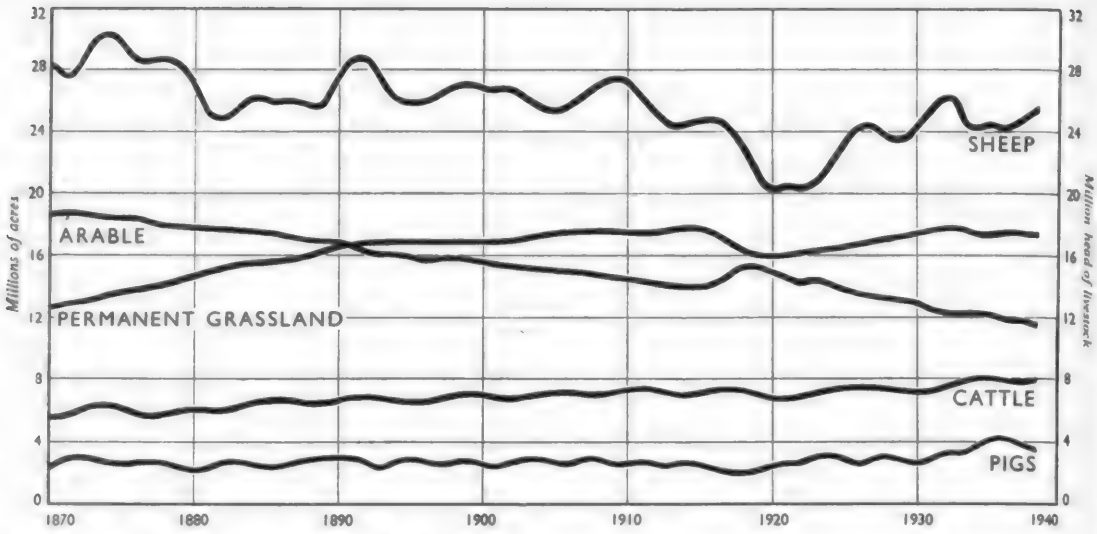


Fig. 4.—The change-over from crops to livestock.

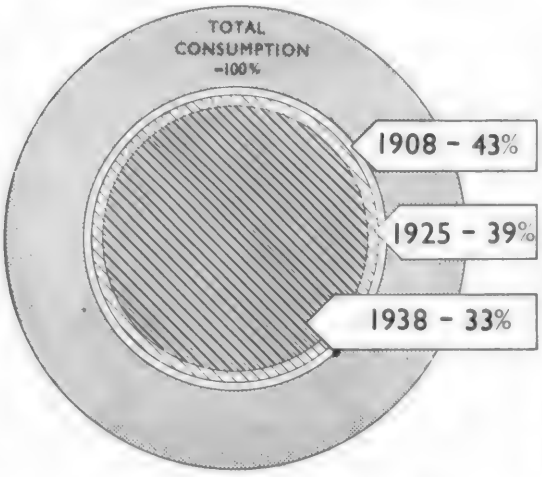


Fig. 5.—Percentage of home-produced food.

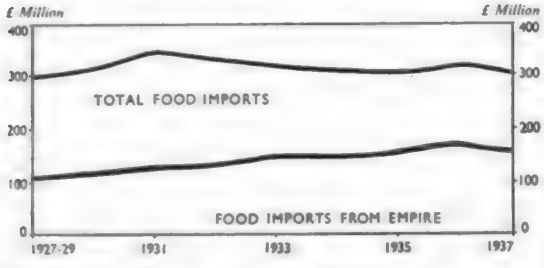


Fig. 6.—Food imports valued at 1927-29 prices.

There was a corresponding change in British farming. From the 1870's onwards, imports of cheap foreign grain severely damaged British arable farming. To a large extent, wheat growing was replaced by meat and dairy farming, and pasture land expanded rapidly at the expense of arable land.

Fig. 5 shows the extent to which home-produced food has met total requirements in the thirty-year period preceding the second world war. It should be remembered, however, that domestic output is partly dependent on imported feedingstuffs and fertilisers. At the beginning of this century, the main food imports were obtained from the American continent, Australia, and New Zealand. Between the two wars, imports from the United States declined, and there was an expansion from European sources, especially for meat. In 1932 Britain finally abandoned free trade, and the Ottawa Agreements brought in the era of tariff and quota protection with Empire preference. The gross output of British agriculture increased, but the dependence on imports, although somewhat checked, remained very great, and the proportion of food imports from the Empire increased (Fig. 6).

The second world war forced radical changes in Britain's food supplies. Imports had to be reduced and home production formed a larger proportion of the reduced total supplies—the present-day position for some of the principal foodstuffs compared with pre-war is shown in Fig. 7.

During the war food could not be obtained from Europe. The war in the Pacific reduced Britain's food supplies from Australia and New Zealand. These gaps were filled by obtaining food from

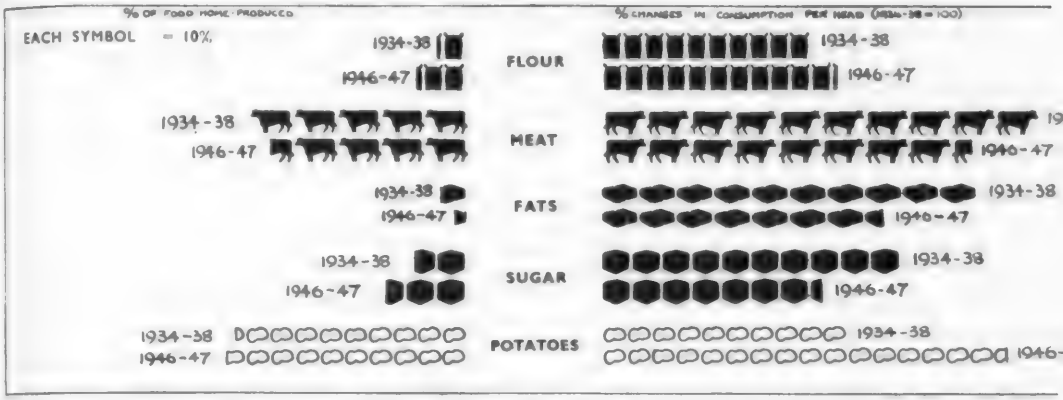


Fig. 7.—The present-day position for some of the principal foodstuffs compared with pre-war.

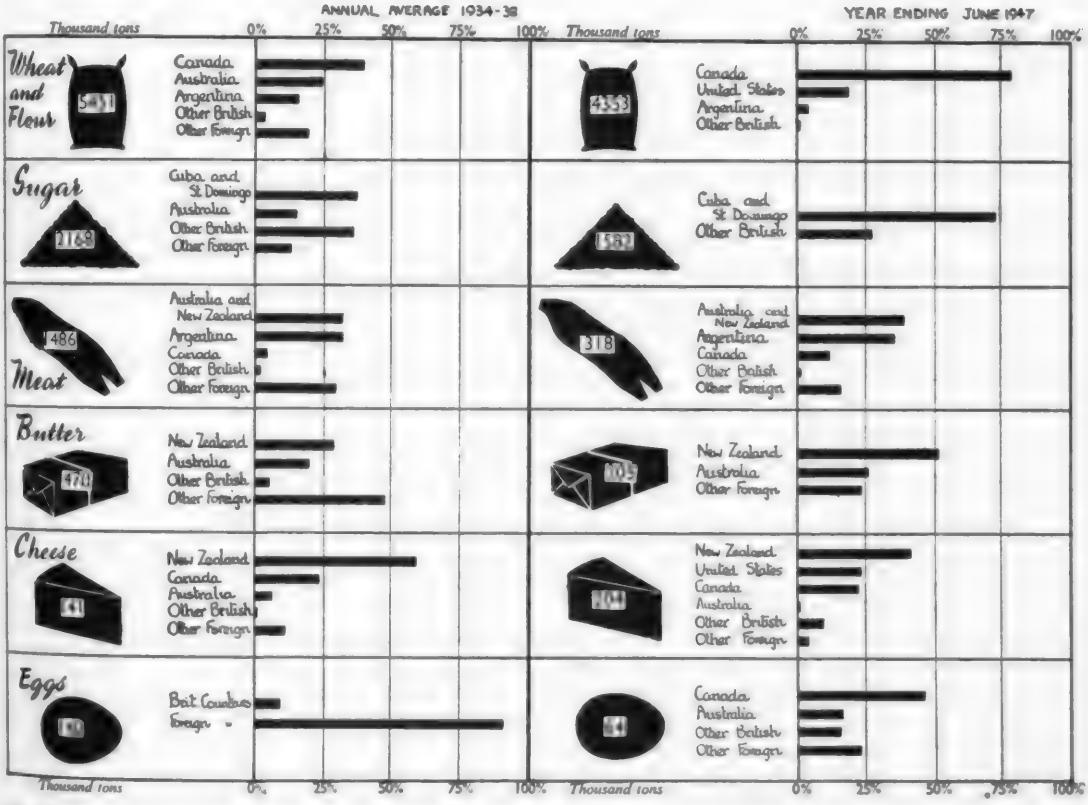
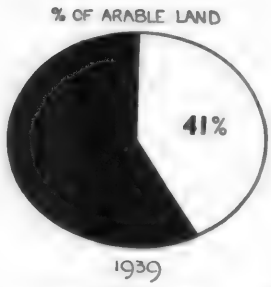
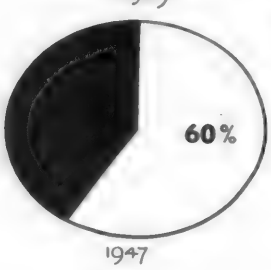


Fig. 8.—Imported commodities and their sources showing annual average for 1934-1938, and imports for the year ending June, 1947.





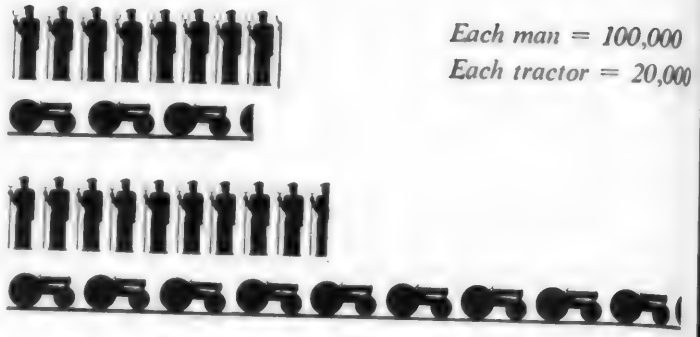
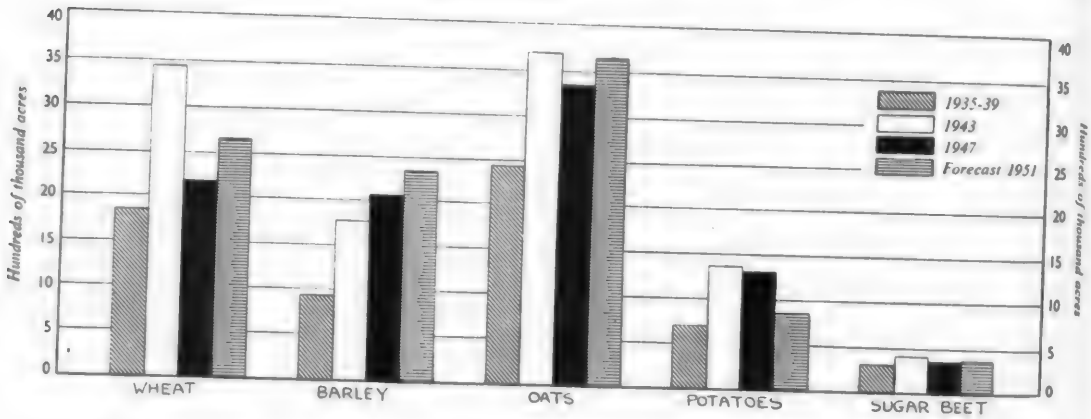


Fig. 9 (Left).—During the war years home agriculture concentrated on growing bulk crops and much grassland was ploughed.

Fig. 10 (Above).—The increase in agricultural workers and tractors during 1939-1947.

Fig. 11 (Below).—Area under main crops from 1935 to 1947, and a forecast for 1951.



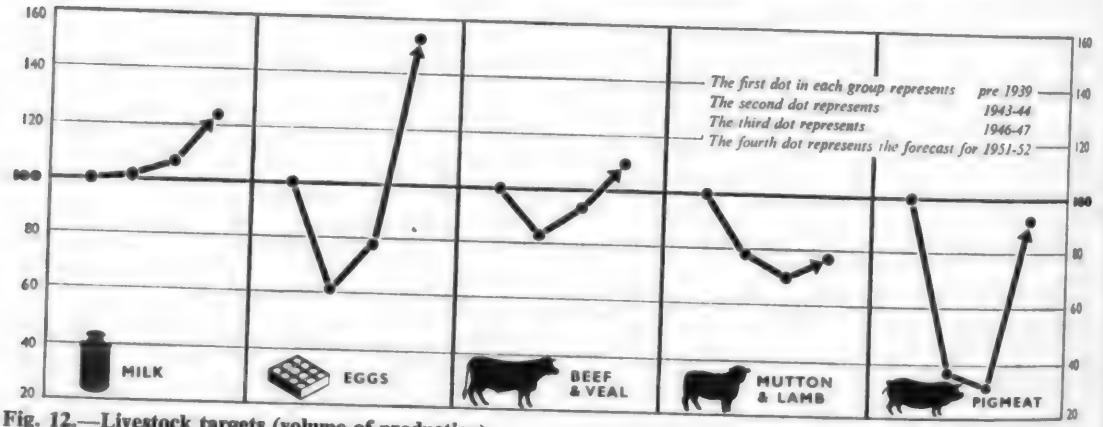

The first dot in each group represents pre 1939
The second dot represents 1943-44
The third dot represents 1946-47
The fourth dot represents the forecast for 1951-52
MILK
EGGS
BEEF & VEAL
MUTTON & LAMB
PIGMEAT

Fig. 12.—Livestock targets (volume of production).

Canada and Argentina, and from the United States under Lend-Lease. The shortage of ships, the tightest bottle-neck of all in war-time, was solved at a heavy cost in dollars.

Home agriculture concentrated on growing bulk crops to save shipping space during the war years, grassland was ploughed, and, with a heavy reduction in imports of feedingstuffs, the numbers of livestock declined. With more agricultural workers and more machinery, home production has increased.

Now Britain faces siege conditions of a different sort. Imports of food must again be reduced. But this time it is not ships that are the great shortage, but dollars, and it follows that the home crops to be stimulated are not the bulky ones but those which are expensive. This has been taken into account in drawing up the Government plan for a 20 per cent. increase in total British agricultural output in five years.

If the targets shown in Fig. 12 are realised, British agriculture will have expanded to a size never previously attained. But even so it should be remembered that Britain will still be a long way from being able to feed herself from the produce of her own farms.

(Reprinted from the "Barclays Bank Review," November, 1947.)

Europe's Fat Supplies

THERE is at present an annual world shortage of some 4,000,000 tons of oils and fats. Supplies can be increased, but the process will be slow. In a speech delivered by the chairman of Lever Brothers and Unilever, Ltd., in London, the steps which can and should be taken to improve the situation were suggested. They were:

(1) The control system, although it cannot yet be abolished in Western Europe, can be made to operate so as to improve the terms of trade by more effective combination in the purchase of raw materials and by the removal of subsidies on the finished products.

(2) The countries of Western Europe can increase their home production.

(3) The production in overseas territories, which exported before the war, must be restored to the full, and the re-establishment of the conditions which will make this possible must be accorded the highest priority.

(4) Additional production must be found by bringing into cultivation unused tracts of land as typified by the East African Groundnut Scheme.

(5) An increased use of materials derived from mineral oils can provide additional quantities of detergents.

(6) Limitation on the catching of whales should be temporarily suspended.

And finally because of the economic plight of Western Europe the resources necessary for the development of new supplies of oils and fats, and indeed of all goods urgently needed, can only be accumulated through better utilisation of existing production facilities and the foregoing of expenditure on them. The most effective accumulation of these resources will be achieved by treating Western Europe as a whole and by following a policy of "make-do and mend" in all fields of activity which do not immediately contribute to the alleviation of essential shortages.

In view of the importance of the subject, not only in itself, but as a part of the world picture of industrial problems, the speech, amplified by a graph and a series of statistical appendices, has been reprinted in the form of a booklet, entitled ***Rebuilding Europe's Fat Supplies.***

Iron in Bread Enrichment

HERETOFORE, ferrous sulphate has not been used in bread or flour enrichment preparations, but in tests conducted by Dr. Aaron Arnold, head of the nutritional research laboratory of the Sterling-Winthrop Research Institute, it has been found to be the best iron compound for this purpose. Dr. Harold Blumberg, who worked with Dr. Arnold simultaneously, reported the findings to the American Institute of Nutrition. According to these findings, "iron in the form of ferrous sulphate, is approximately four to five times available for biological use as ferric orthophosphate iron."

Rated against ferrous sulphate as 100 per cent., the biological availability of other iron compounds were shown by the tests to be: reduced iron 83 per cent., ferric orthophosphate 38 per cent., and sodium iron pyrophosphate 21 per cent.

The compounds were tested for ability to speed up haemoglobin regeneration in anaemic rats, when baked in bread and fed to the animals. Dr. Arnold has described his test as more complete than previous investigations on the assimilability of ferric orthophosphate in that quantitative results were determined on four different levels of food intake. He pointed out that this re-investigation was considered necessary in view of the importance of ferric orthophosphate in the bread enrichment programme, where it is added as a way of making the bread more nutritious for anaemic people. Results indicate that it is highly desirable that the iron supplements in bread and flour consist of a highly assimilable form of iron such as ferrous sulphate or reduced iron so that the maximum benefit may be obtained by the consumer.

A Food Manufacturer's Handbook

FOOD manufacturers, food chemists, and students of food technology have a wide choice of books dealing with their subject—books fresh from their authors' pens and books in new editions.

An authoritative manual dealing with every phase of the industry, published annually, stands out prominently, if not uniquely, among food literature.

Such a volume* has just been published in its fifteenth edition. Encyclopaedical in its arrangement, it is divided into sections, written by acknowledged experts in their particular field. The sections include:

Cereals: Wheat, Milling, Flour, Baking, Flour Confectionery.
Sugar Confectionery: Candy, Chocolate, Jams, Jellies.
Canning and Preserving.
Meat Products.
Pickles and Sauces.
The Dairy Industry.
Food Dehydration.
Food Storage and Refrigeration: Insulation, Air-conditioning.
Food Handling: Plant and Equipment.
Edible Fats and Fatty Foods.
Fruit Juice Products.
The Boiler House.
Composition of Foods.

In common with previous editions, the contents have been revised and brought up to date in the light of recent developments, and two important new sections have been added—one on edible oils and fats and the other on fruit juice products.

Edible Fats and Fatty Foods, a section of sixty-eight pages, has been written by R. Child, B.Sc., Ph.D, (London), F.R.I.C., and gives the characteristics of all the fats and oils likely to be met with in commerce. In the various sub-sections such matters as refining, hydrogenisation, and other aspects of preparation of fats and oils are included.

Dr. V. L. S. Charley, whose work on fruit juices is well known, has contributed the section on this subject. Mr. Charley writes as an expert who has actually carried out, and in many cases originated, the processes he describes.

The Dairy section has been carefully revised, new matter presented, and out-of-date details deleted, while the Packaging section contains considerable additional data regarding new materials developed during and after the war.

Ease of reference is ensured by the alphabetical arrangement of the items in each section, and this is augmented by a comprehensive subject index containing more than 2,000 items.

* *Food Industries Manual.* Fifteenth Edition. Edited by T. Crosbie-Walsh, F.R.I.C. Leonard Hill Limited. London. Pp. 1168. 42s. net.

The Irish Confectionery Industry

IN spite of war and restrictions the Irish sweet industry has during the last half-century reached a considerable degree of development.

Before the introduction of machinery the only confectionery produced in Ireland was toffee and barley sugar, made by the primitive and inefficient method of boiling sugar on an open fire.

The erection of beet sugar refineries by a native government and a nation-wide propaganda campaign encouraging farmers to grow sugar beet further stimulated the industry. The larger firms, totalling about forty-five, centred about Dublin, Limerick, and Cork, have now reached a high state of industrialisation.

Supplies of cocoa (imported from Britain), compounded essences and colours were fair during the war years and the problem of sugar was partially solved by a planned policy on the part of the sugar industry. Of 60,000 tons of beet sugar produced by the Irish Sugar Company last year, and of imports totalling some 20,000 tons, the sugar confectionery and allied industries consumed roughly 30,000 tons.

Irish production operations are performed in much the same manner as in British factories.

Scarcity of raw materials has up to the present prevented manufacturers from satisfying heavy home requirements, and during last year Dutch and Czechoslovakian confectionery has been imported to fill the gap. The demand, too, for cheaper classes of sweet has created a difficult problem in view of the scarcity of shelled almonds from Valencia.

Such sweets as aniseed balls and liquorice rolls always had a steady sale among the juvenile population in Eire, and there are many small Irish firms (some acting as their own retailers) specialising in this type of sweet manufacture.

The manufacture of high-class chocolate confectionery is still a 50 per cent. hand operation in Eire.

Before the war 90 per cent. of Irish confectionery was consumed at home, but there is every indication that technicians and chemists in Eire are fully alive to the possibilities of establishing a thriving export market in the future.

(*Concluded from the preceding column*)

Lists of manufacturers of products, plant, and equipment, arranged in alphabetical order, complete this enlarged edition of this already well-known book.—I. L. J.

Methods for the Estimation of Pectin

A. R. DESCHREIDER, ING. CHIM., I.A.Lv., and
SIMONE VAN DEN DRIESSCHE, Doc. ès Sc.
Central Laboratory, Belgian Ministry of Food

THE methods of estimation of pectin recommended by the majority of works dealing with the analysis of food products depend on the precipitation of the pectin as calcium pectate, according to the technique of Carré and Haynes[1] or Griebel and Weiss.[2] Certain authors, among whom are Hinton,[3] C. F. Ahmann, and H. D. Hooker,[4] or H. Deuel,[5] carry out the estimation by volumetric methods. An examination of these two types of methods was undertaken by the present authors.

The modern view of pectin shows it as being a partially methylated long chain molecule consisting of a varying number of chain units, each of which consists of anhydrous galacturonic acid.

Fig. 1* shows how galactose can be transformed into anhydrous galacturonic acid.

Fig. 2† represents a chain of the acid in question. The characteristic of the pectin chain molecule is the methyl-ester groups ($-COOCH_3$) which are present. A portion of this molecule would have the aspect shown in Fig. 3.‡

Such a molecule, completely demethylated, consists of free acid groups (Fig. 2). In this state it is called pectic acid, and has, among other properties, that of forming pectates. Pectic acid corresponds to the general formula $(C_5H_7O_4.COOH)n$, in which the chain units have a molecular weight of 176.

A partially methylated chain, characteristic among commercial pectins, has a general formula $(C_5H_7O_4)n(COOH)m(COOCH_3)n\text{-}m$ in which the methylated chain units of formula $C_5H_7O_4.COOCH_3$ have a molecular weight of 190.

Von Fellenberg has pointed out that pectin is saponifiable by alkalies, as they act upon the methyl groups to substitute a metallic ion for the

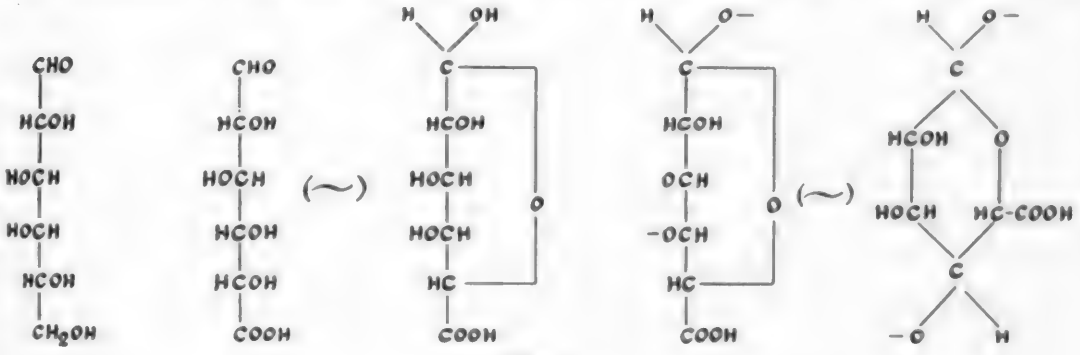


Fig. 1.

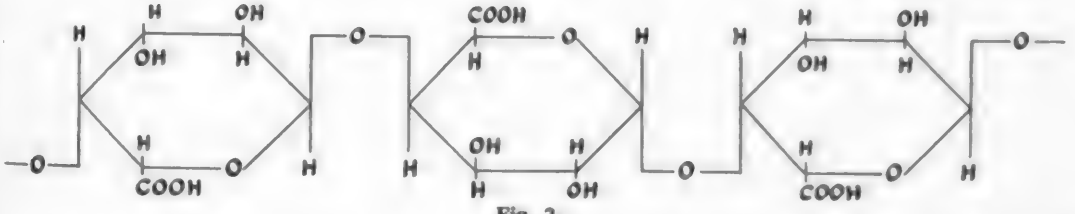


Fig. 2.

* Taken from C. W. Kaufman, E. R. Fehlberg, and A. G. Olsen, *Food Industries* 14, 12, 57, 1942.

† Taken from K. H. Meyer, *Natural and Synthetic High Polymers*, Interscience N.Y., 1942, p. 367.

methyl group. This property has been used in the titration of a solution of pectin.

‡ According to S. Luckett and F. Smith, *J. Chem. Soc.* (Lond.), 1940, 1106-18.

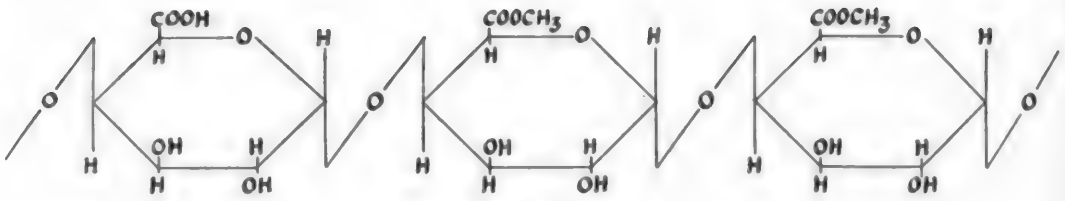


Fig. 3.

C. F. Ahmann and H. D. Hooker (*loc cit.*) use the following method:

To a solution of pectin containing 0·25 to 1·0 g. of pectin in 200 ml., a known quantity of alkali (50 ml.) is added from a pipette, so that the concentration of the alkali is about 0·1 Normal. The solution is made up to 250 ml. and allowed to remain at a temperature of 55° C. for twelve hours. The flask is stoppered during the hydrolysis to prevent the absorption of carbon dioxide. Aliquot quantities are taken and titrated with hydrochloric acid. The sodium hydroxide should be about four times as strong as the acid used for the back titration.

The amount of pectin present is calculated from the number of ml. of alkali combined with the pectin. Taking as molecular weight of the pectic acid at 55° C. a value of 194·9, which corresponds to a pectin of molecular weight of 208·9:

$$\text{Wgt. of pectin} = \frac{\text{mls. combined NaOH} \times \text{normality} \times 208{\cdot}9}{1{,}000}$$

It will be indicated in the course of this article that the molecular weights used by Ahmann and Hooker are too high and introduce a source of error. Furthermore, this method can only be applied to purified pectins.

We need only mention the method applied by C. L. Hinton (*loc. cit.*), its principle being very similar to that which we have studied and which we shall develop below.

Hinton extracts the pectin with alcohol or acetone. It is subsequently re-dissolved, demethylated with a dilute alkali and the solution adjusted to *p*H 7·5, using a convenient indicator. Pectic acid which is thus formed is estimated by the addition of excess of hydrochloric acid (0·1 Normal), filtration of the precipitate and back titration of the excess acid.

The demethylation of pectin by dilute alkali is practically instantaneous, and this property can be used for the quantitative estimation by volumetric methods.

For our experiments, we used a method based on that proposed by H. Deuel (*loc. cit.*). The estimation is carried out in two steps: first, the solution of pectin is titrated with dilute alkali in the presence of a suitable indicator. The number of ml. of alkali used represented by a value X corresponds to the sodium hydroxide equivalent of the free pectic acid present in the pectin. Afterwards, an excess of dilute alkali is added to the solution previously titrated in order to demethylate the pectin. This is followed by the addition of an excess of acid. By back titration the number of ml. of alkali representing a value Y is obtained; this being the sodium hydroxide equivalent of the saponified pectin. From these values, X and Y, the weight of the pectin in the solution is calculated by the formula: $(176X + 190Y) = g.$

176 is the molecular weight of a unit of pectic acid, and 190 the molecular weight of a completely methylated unit of pectin.

Modified Method

The method we have used is as follows:

25 ml. of approximately 0·5 per cent. solution of pectin are placed in a 300 ml. Erlenmeyer flask. 5 ml. distilled water are added and 3 drops of methyl red. The solution is titrated with N/20 sodium hydroxide to the appearance of a slight red colour, the titration being carried out using a micro-burette graduated in 1/100ths of a ml. Let (a) be the number of ml. used. This is followed by the addition of 25 ml. of N/20 sodium hydroxide. The flask is stoppered and the solution left for half an hour at room temperature. After this time, 25 ml. N/20 sulphuric acid are added. Again, using a micro-burette, the excess sulphuric acid is titrated. Let (b) be the number of ml. of N/20 sodium hydroxide used. This number (b) represents the quantity of sodium hydroxide needed for the saponification. The quantity of pectin present in the 25 ml. of solution can be calculated by the formula:

$$\frac{0{\cdot}176(a) + 0{\cdot}190(b)}{2} = g.$$

In our experiments we used powdered pectin from a variety of sources, viz. Switzerland, Germany, America, and Belgium.

Variations of the Titration of Unpurified Pectin as a Function of Temperature and Time

For this experiment a pectin of American origin was used. After having added to 25 ml. of a 0·5 per cent. solution of pectin an excess of N/20 sodium hydroxide, the stoppered flasks were left for different times, at room temperature, at 37° C., and at 60° C. The results are given in the curve shown in Fig. 4.

It is to be noted that the value Y, and in consequence X+Y, increases considerably at high temperatures, and this during the whole course of the experiment, while at room temperature, X+Y does not increase during the first eighteen hours, but after this time the value begins to increase.

In consequence (and other experiments confirm this) estimation by titration can be applied at ordinary temperatures to a powdered pectin which has not been previously purified.

Relationship Between the Increase in the Value of Y at 60° C. and the Presence of Reducing Agents.

Struck by the regular rate of increase of the curve at high temperatures, we endeavoured to discover the reason for it. Analysis of different commercial pectins disclosed the quantity of reducing agent present varying from 6·9 per cent. to 47 per cent. of a glucose. For the following experiments we used a pectin of German origin, which on analysis was shown to contain 19 per cent. of reducing agents calculated as glucose.

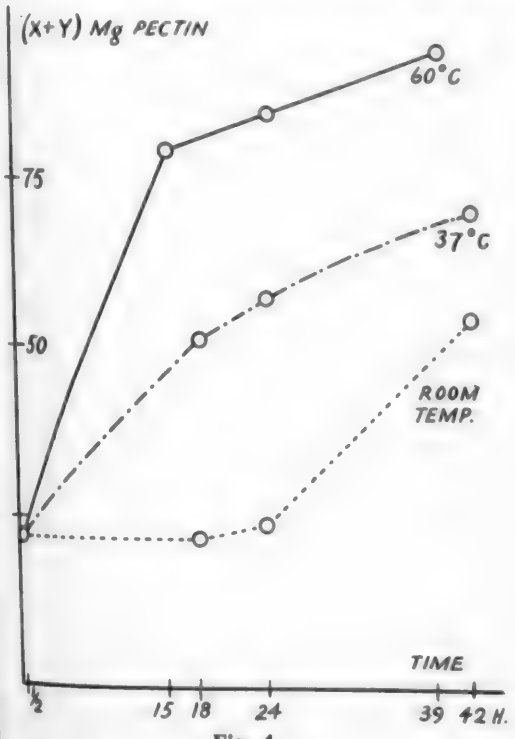


Fig. 4.

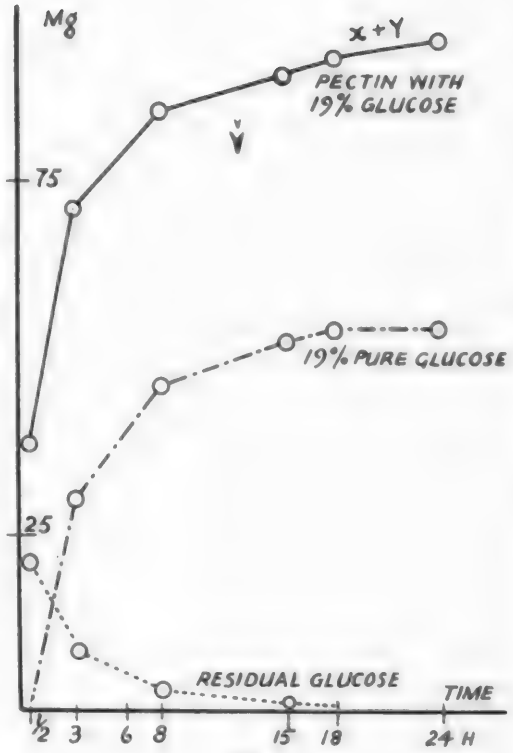


Fig. 5.

The variation X+Y is given by the curve in Fig. 5.

In addition, we prepared a solution of pure glucose of such concentration that 25 ml. of this solution contains a quantity corresponding to that present in 25 ml. of a 0·5 per cent. solution of pectin.

The solution was allowed to stand at 60° C. and titrated at different intervals. Each time we estimated the quantity of glucose still present in the 25 ml.

It can be seen that this solution of glucose neutralises the sodium hydroxide in a quantity increasing regularly with time. Inversely, the quantity of glucose present decreases. When this quantity becomes 0 (in this case, after eighteen hours), the value Y calculated as pectin becomes constant.

It is interesting to note that by subtracting the value Y' (as pectin) found for the solution of

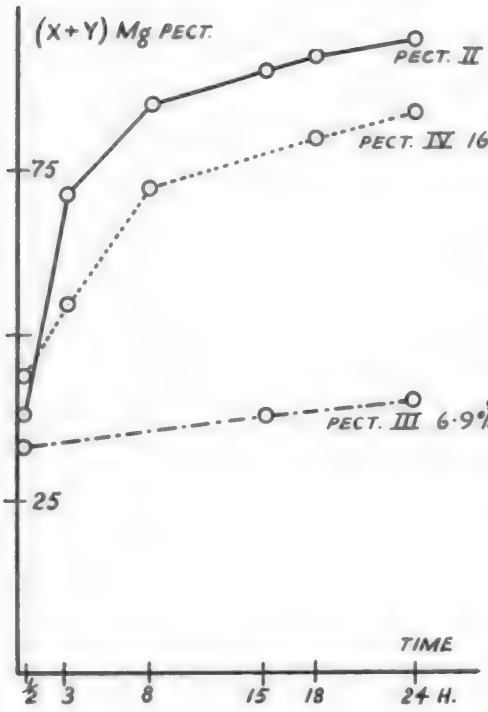


Fig. 6.

glucose, from the value (X+Y) found for the pectin, the result is practically equivalent to the initial value (X+Y). This is shown in Table I.

The increase in X+Y after eighteen hours is due to the pectin itself, as will be confirmed in experiments with purified pectins.

TABLE I

Times at 60° C.	(X+Y).*	Y'.	(X+Y)−Y'.	*Remaining Glucose (in mg.).*
30 min. ord. temp. ..	38·2	0	38·2	21
8 hours ..	85·0	45·8	39·2	3
15 hours ..	89·7	52·6	37·1	traces
18 hours ..	93·1	54·1	39·0	nil
24 hours ..	95·2	54·0	41·2	

* Quantities in mg. found for 25 ml. of the 0·5 per cent. solution.

We have determined the variation in the value (X+Y) for commercial pectins containing varying amounts of reducing agents. The difference between the value of (X+Y) at the beginning and at the end of the experiment diminishes as the amounts of reducing agents present in the pectins diminish.

Fig. 6 shows the curves for pectins having respectively 19, 16·3, and 6·9 per cent. reducing agent.

Variations of the Titration of Purified Pectin as a Function of Temperature and Time.

We used the following technique to purify commercial pectins:

2·5 g. of the sample were placed in a ground glass stoppered conical flask of 300 ml. capacity. To this were added 100 ml. of acidified methyl alcohol.* The mixture was left for twenty-four hours, being shaken occasionally. At the end of this time, the pectin was filtered on a Büchner funnel. The pectin was washed with alcohol until the filtrate gave no reaction for chloride. The residue was then washed with ether and left until the ether had evaporated.

The purified product was then dissolved in distilled water.

The estimation of (X+Y) after various times of standing at room temperature and at 60° C. has been carried out on solutions prepared as above.

Fig. 7 shows that there is still a slight increase in this value, an increase which, in certain cases, is less pronounced at room temperature than at 60° C.

* The solution contains 800 ml. of methyl alcohol and 90 ml. of N hydrochloric acid.

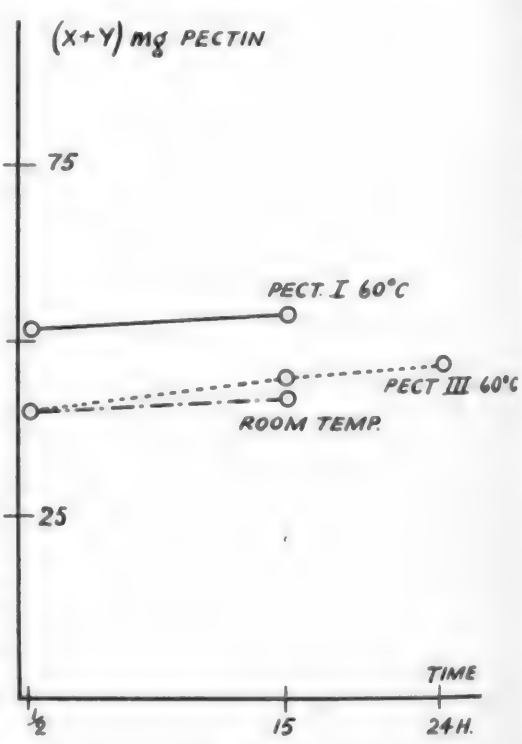


Fig. 7.

TABLE II

Source.	Unpurified Pectins. Red. Agent Per Cent.	Pectate mg.	Pectate −8 Per Cent.	(X+Y) mg.	Purified Pectins. Red. Agent Per Cent.	Pectate mg.	Pectate −8 Per Cent.	(X+Y) mg.
America ..	47	24·15	22·2	21·8	nil	57·4	52·8	51·5
Switzerland	6·9	35·2	32·4	32·9	—	—	—	—
Germany ..	19·2	41·5	38·2	38·2	nil	45·0	41·4	40·7
Belgium ..	16·35	47·1	43·1	43·7	—	—	—	—

Accuracy of the Volumetric Method.

We have compared the results obtained by volumetric methods, after leaving half an hour at ordinary temperatures, with the results obtained by the method of Carré and Haynes in accordance with the technique of Griebel and Weiss, for details of which we refer to the latter part of this article. However, in this comparison it is necessary to take account of the fact that calcium pectate is a salt in which the calcium accounts for 8 per cent. of the weight,* whereas the volumetric method gives the pectin itself. Thus it is necessary to decrease the value found as calcium pectate by 8 per cent. before comparing the two results. This is a fact which the authors referred to seem to have forgotten when they compare the calcium pectate method with another method.

Table II shows the agreement existing between the titration method and the calcium pectate method.

In the article by Ahmann and Hooker (*loc. cit.*) it is noted that the variations in the course of the saponification at 23° C. are less marked than at 55° C. We have seen that this has been verified in the case of our purified pectin, but to a less pronounced degree. This would seem to be due to the fact that the author used a stronger solution of sodium hydroxide (0·424 N).

Ahmann and Hooker, who used a pectin purified to a very high degree by a special technique, found on titration a slightly larger weight of pectin (2·4–5 per cent.) than that originally taken. In our experiments, a purified pectin has given 52·8 mg. as pectin by the calcium pectate method (minus 8 per cent.), and by titration after standing fifteen hours at 60° C. we found 54·2 mg. That is an increase of 2·65 per cent. due to the high temperature. To this must be added the error due to the high molecular weight (208·9) which the author used in his formula. The following examples indicate that the molecular weight is too high:

Applying the method of Hooker to an unpurified pectin, and using in the calculation the molecular weight 208·9, we find 99 mg. of pectin.† If we use the molecular weight 190* we find 90·7 mg. On the other hand, the same solution of pectin, after standing for fifteen hours at 60° C. under the conditions of our method of estimation and applying the formula (176X+190Y), gave 89·7 mg. of pectin.

A different pectin, studied under the same conditions, has given us by Hooker's method and taking the molecular weight as 208·9, 61 mg. of pectin, with the molecular weight 190, 55 mg., and by titration after fifteen hours at 60° C. and using the formula of Deuel, 53·7 mg.

Discussion

Our experiments indicate that the saponification of the pectin is practically instantaneous, and that consequently it is possible to use H. Deuel's titration method to estimate powdered commercial pectins, without previous purification, provided that the estimations are carried out at room temperature. Even with purified pectins, working at an elevated temperature for some time leads to errors.

Obviously, if it is necessary to analyse a pectic juice, the pectin must first be precipitated with alcohol, filtered and dissolved in a known volume of distilled water (*e.g.* 30 ml.) after careful washing on a filter. It can then be estimated volumetrically.

Unless a potentiometer is available, we recommend the use of N/20 reagent, a micro-burette, and half an hour's reaction time at ordinary temperatures.

Methyl red is the indicator which has given us best results.

We have tried to estimate the pectin in jams by this method. Unfortunately, this is not possible, because the solutions from which the pectin should be separated before titration are difficult to filter and the volumes of liquid are too large to allow the use of a centrifuge.

We point out finally that G. Mosimann[6] has applied this method of titration to the pectin in cocoa powder. This gives results practically equal to those obtained by the calcium pectate method when due allowance is made for the calcium.

It is necessary to observe that a variant of this method is equally applicable, namely the estima-

* According to H. Löers and K. Lochmüller, *Kolloid Ztschr.*, **42**, 154–163.

† Without taking account of any error due to reducing agents.

* Disregarding the original pectic acid of molecular weight 176.

tion of the amount of methoxyl present, using the following formula:*

$$\text{Per cent. } CH_3O = \frac{\text{ml. of } 0{\cdot}5\text{N NaOH } 1{\cdot}55}{\text{g. of pectin}}$$

Estimation of Pectin in Jams

In view of the inapplicability of the volumetric method of estimating the pectin in jams, we must admit that at present it is necessary to use the calcium pectate method of Carré as modified by Griebel and Weiss (*loc. cit.*), a method which is indeed that most commonly used in food chemistry. It is based on the treatment of a solution of pectin by dilute alkali, followed by precipitation with calcium chloride in acetic acid solution. The precipitate is filtered, washed, dried, and weighed as calcium pectate.

Until now, for this method, it is usually recommended that the saponification shall proceed in a covered vessel throughout the night or at least for seven hours. No reason is given for this long time of reaction.

From our previous experiments and according to the opinion of various authors, it appears, however, that this saponification is practically instantaneous. We have seen above that the action of the dilute alkali consists in removing the methoxyl groups, thus freeing the carboxyl groups, and these latter are precipitated by calcium chloride.

K. Taufel and E. Just[7] have shown that the formation of calcium pectate does not depend on the duration of saponification, and their experiments on powdered commercial pectins prove that, after ten to fifteen minutes, the hydrolysis is certainly complete. These authors are of the opinion that shortening the time avoids the possibility of decomposition of the pectin, which invalidates the results.

We have repeated this work to see if these ideas are applicable to jams, and have used reaction times of respectively fifteen minutes and one night working in the following manner for the estimation:

100 ml. of a one in ten solution of jam, prepared as we have recommended in a previous work,† is placed in a 600 ml. beaker with 100 ml. of N/10 sodium hydroxide. The whole is stirred, and when it has been confirmed that the product is distinctly alkaline, the vessel is covered with a watch-glass and left overnight. In further experiments, a fifteen minute period was employed.

Then 50 ml. of N acetic acid (60 g. per litre) is added, and after five minutes 50 ml. of a solution of calcium chloride (111 g. per litre) is added. After stirring, the mixture is left for an hour at room temperature; it is then held at boiling-point for one minute and filtered on an ordinary coarse-fluted filter.

The precipitate is then washed with hot water and replaced in the original beaker with 200 ml. of hot water. After re-heating to boiling point, the precipitate is quantitatively removed to a weighed filter. The gelatinous precipitate is collected on the filter, washed and broken up several times with a stirring rod. Washing is continued until the washings give no further reaction for chloride. The filter is dried for eight hours in an oven and weighed. It is replaced in the oven and dried until the decrease in weight over two hours is not greater than 0·5 mg. During the early stages of the drying the filter is left in the funnel, but when it is nearly dry it is transferred to a weighing bottle.

If the weight of the calcium pectate obtained exceeds 50 mg., the experiment should be repeated, using 50 ml. of the original solution.

In Table III are given results obtained after saponification lasting 15 min. and one night respectively.

The estimations were carried out with a number of different jams.

TABLE III

No. of Sample.	*Per Cent. Ca Pectate.*	
	15 Min. Sapon.	*1 Night Sapon.*
1371	0·48	0·45
1271	0·35	0·34
1271	0·34	0·37
1279	0·54	0·56
1280	0·45	0·46
1273	0·42	0·40
1272	0·45	0·40
1270	0·37	0·41
1270	0·36	0·37

It is seen that these results entirely confirm the theory of Taufel and Just, even for a product such as jam.

Consequently, we have proposed to reduce the time of saponification to fifteen minutes for the estimations on jam. If the strength of the pure pectin is required, the weight of pectate found must be reduced by 8 per cent.

The estimations must be carried out on freshly prepared solutions of jam, as we have noticed considerable discrepancies during the ageing of the solutions, even if they are carefully preserved under good conditions.

* Cf. the interesting article on this subject by Claude H. Hills, Clyde L. Ogg, and Rudolf Speiser in *Ind. Eng. Chem., anal. ed.* 1945, vol. 17, **8**, 507.

† R. Deschreider, *Bepaling der droge stof en van het ontsuikerd extrakt in konfituur*, Med. Vl. Chem. Ver., No. 3, March, 1946.

Summary

Estimations of pectin have been carried out on aqueous solutions of commercial pectins from different sources. The method recommended is that of H. Deuel, which gives results agreeing with those obtained by precipitation as calcium pectate, corrected for the calcium present. The work has shown that reducing agents invalidate the results at temperatures higher than 20° C. This is immaterial if the work is done in the cold, and under these conditions purification is not necessary except for pectin containing acid substances. The method of Ahmann and Hooker leads to slight errors due to the high temperature and to the molecular weight used in the formula. The titration method has the advantage of determining the quantity of free pectic acid present. In the second part of this article it is shown that during the estimation of pectin in jam, the time of saponification may be lowered from seven hours or one night to fifteen minutes without affecting the accuracy of the results.

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[5] Deuel, *Mitt. Lebensm. Hyg.*, Bern, **33**, 1942, **34**, 1943.
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[7] Taufel and Just, *Z. Untersuch. Lebensmitt.*, **82**, 1941.

Bakery Research

A MEMBERSHIP of 367, representing an annual subscription of approximately £7,500, was announced in the first annual report of the Council of the British Baking Industries Research Association for the year ended June 30, 1946, presented at the second annual general meeting of the Association held on November 13, Mr. R. T. Colgate, D.Sc., F.R.I.C., chairman, presiding. These figures have now been increased to well over 500 with a subscription income nearing £10,000 per annum. Satisfactory as was this growth in the face of the difficulties of the first complete year of the Association's existence, it was well below the target which must be reached to enable it to continue to claim the grant promised by the Department of Scientific and Industrial Research.

In view of the fact that the balance of income over expenditure was estimated to be sufficient to cover the cost of purchasing the Research Station, together with the initial scientific and administrative equipment, the income of future years would be available for current research work, apart from new structure or equipment.

Considering the scope for research, Mr. Colgate said that the work to be undertaken would fall into two main categories: investigation of current problems, and fundamental research. The former would include the investigation of day-to-day problems affecting the whole industry, and the latter would undertake research work of a long-term nature into such items as nutritional matters, problems relating to panary fermentation, ripeness of dough for breadmaking, biscuit flours and doughs, the application of refrigeration and electronic heating to the industry, and studies into the suitability of new materials finding their way into the industry. Research would also be carried out in the physical properties of doughs, emulsions, foaming, problems of shortening, batter stability in cake-making, checking of biscuits, staling of bread, fuel utilisation, investigation into methods of preservation of baked products, including studies of packaging generally.

In addition it was intended that information and advice would be given on such topics as air conditioning, fire prevention in bakeries, pest control, destruction of vermin, and matters affecting hygiene of equipment and personnel.

Culture Collections of Micro-Organisms

THE setting up of an organisation, to be known as the British Commonwealth Collections of Micro-organisms, is recommended in a recently published report giving the proceedings of a conference held in London in August, 1947, on "Culture Collections of Micro-organisms." A research worker who is studying human, animal, or plant diseases—for example, diphtheria, bovine tuberculosis in cattle, or apple scab, often requires authentic cultures of the organisms responsible. He needs them either to help him to identify the parasites he has isolated or to test new drugs or treatments. Similarly, anyone who is trying to find means for preventing micro-biological attack leading, say, to the rotting of sandbags or dry rot in timber, or is studying tropic proofing of packed stores, may wish to obtain standard strains of the organisms involved.

There is also an increasing demand from industry for strains of fungi, yeast, and bacteria having certain specified biochemical characteristics, such as for edible yeasts or brewing, the preparation of lemonade powder, or the production of streptomycin.

These demands are met by a number of national and private collections of cultures of micro-organ-

isms. For some time past it has been felt that the scope of some of these collections required enlarging while some classes of organisms were not adequately provided for.

The main recommendations now made are that:

(*a*) An organisation known as the British Commonwealth Collection of Micro-organisms should be established to foster the maintenance of existing collections, to make the cultures in these collections more fully available for general use, and to encourage the establishment of such new collections as may be necessary.

(*b*) A Permanent Committee should be set up in London to provide for the central administration of this Commonwealth Organisation.

(*c*) One of the duties of this Committee should be the preparation of a directory of collections and catalogues of cultures in the collections.

The conference also suggested certain standard procedure for the referencing and cataloguing of the organisms in a collection and for the distribution of cultures. As regards dangerous human, animal, and plant pathogens, the conference recommended that they should be sent to a territory only after the quarantine and other restrictions that may be in force had been complied with. Other safeguards are also recommended.

Ministry of Food

Latest Statutory Rules and Orders

The list given below is the continuation of the list of Orders published in *Food Manufacture*, January 1, 1948, page 10.

No.	*Date.* 1947.	PRICE FIXATION ORDERS
2469	Nov. 18.	The Poultry (Control and Maximum Prices) Order. Revokes S.R. & O. 1946, Nos. 1458, 1989; 1947, No. 330.
2559	„ 29.	Order amending the Milk (Control and Maximum Prices) (Great Britain) Order, 1947.
2585	Dec. 3.	Order amending the Feedingstuffs (Maximum Prices) Order, 1946.
2590	„ 4.	Order amending the Cereal Breakfast Foods (Control and Maximum Prices) Order, 1947.
2591	„ 4.	Order amending the Cheese (Control and Maximum Prices) Order, 1946.
2687	„ 15.	Order amending the Pulse (Control and Prices) Order, 1943. Revokes S.R. & O. 1947, No. 110.
		FRUIT
2543	Nov. 28.	The Imported Deciduous Fruit Order.
2558	„ 29.	Order amending the Citrus Fruit Order, 1945.
		GELATINE
2500	Nov. 21.	Order amending the Edible Gelatine (Control) Order, 1947.
		LICENSING OF RETAILERS
2421	Nov. 12.	Order amending the Food (Licensing of Retailers) Order, 1945.
		MEALS IN ESTABLISHMENTS
2512	Nov. 24.	The Establishments (Christmas Turkeys) Order.
2587	Dec. 2.	Order amending the Meals in Establishments Order, 1946.
		POINTS RATIONING
2586	Dec. 3.	Order amending the Food (Points Rationing) Order, 1947.
		POTATOES
2468	Nov. 18.	Order amending the Potatoes (1947 Crop) (No. 2) Order, 1947.
2676	Dec. 12.	The Potatoes (Control of Supply) (No. 2) Order. Revokes S.R. & O. 1947, No. 2402.
2697	„ 13.	Order amending the Potatoes (1947 Crop) (No. 2) Order, 1947.
		RATIONING
2220	Oct. 16.	Order amending the Bacon (Rationing) Order, 1947.
2364	Nov. 6.	Order amending the Fats, Cheese and Tea (Rationing) Order, 1947.
2365	„ 6.	Order amending the Sugar and Preserves (Rationing) Order, 1947. Revokes S.R. & O. 1947, No. 1956, 2094.
2401	„ 8.	Order amending the Bread (Rationing) Order, 1947.

Calendars and Diaries Received

CALENDARS from Stevenson and Howell, Ltd.; Standard Synthetics, Ltd.; Sternol, Ltd.; Medina Refinery, Ltd.; Billing and Sons, Ltd.; Leyland Paint and Varnish Co., Ltd.; Edwin Jones and Sons (London), Ltd.; John M. Hamilton and Co., Ltd.; and Ormerods, Ltd.

Diaries from Stewarts and Lloyds, Ltd.; British Nylon Spinners, Ltd.; Manchester Oil Refinery Co., Ltd.; Wightman and Co., Ltd.; Bamag, Ltd.; Rex Campbell and Co., Ltd.; and John Morrell and Co., Ltd.

Desk calendar refills from Walls, Ltd.; Clive Hughes and Co., Ltd.; Bamag, Ltd.; Wood and Fairweather, Ltd.; Stevens and Williams, Ltd.; Stewarts and Lloyds, Ltd.; Walford and Co., Ltd.; Advance Tyre and Rubber Co., Ltd.; Doulton and Co., Ltd.; Loughborough College School of Arts and Crafts; M. Hamburger and Sons, Ltd.; Brook Motors, Ltd.; Oliver Pragnell and Co., Ltd.; and British Ropes, Ltd.

News from the Industry

Space Warming by Electricity

An illustrated booklet has recently been published by Richard Crittall and Co., Ltd., describing different methods of space warming by electricity. An interesting item is electric low temperature radiant warming from the ceiling, a feature of the system being that it affords no lodgement for dust and dirt, whereas convectors and pipes not only provide such lodgement but cause the air to carry dust and dirt which can be deposited on walls, ceilings, and curtains. Automatic temperature control is provided by the thermostat and thermal insulation is used in the roofs and intermediate floors.

Food Legislation

With the full approval of the Borough Council, Stretford (Lancashire) Health Committee is asking the Association of Municipal Corporations to urge the Minister of Health to consider regulations being made for the sale and delivery of food.

The matter was considered by the Committee after a letter from Stretford Divisional Labour Party which expressed concern at "the present laxity and in some cases lack of precautions shown in the exposure for sale of various items of food, particularly fish and bread, which are often sold from carts in the streets without concern for cleanliness on the part of persons handling these and other commodities."

Councillor Doctor A. W. Davison, Health Committee chairman, stated: "New legislation would not be required. The law already makes possible such regulations, but the Health Minister has, up to the present, not made any model by-laws for adoption, controlling sales in the open air.

"We want the Municipal Corporations' body to ask the Minister to formulate and issue such by-laws."

New Ekem Developments

New arrangements for the manufacture and distribution of the British designed and made Ekem vacuum operated liquid filling machine, model 1950, are announced. Mr. E. K. Moessmer, Dipl.Eng.M.I.B.E., the inventor and governing director of Ekem Engineering Ltd., has arranged for the European manufacture and distribution of this machine to be carried out by Busby, Winter and Co., Ltd., whose chairman is Sir Wavell Wakefield, M.P.

These arrangements have become necessary in view of Mr. E. K. Moessmer's departure for South Africa to take up duties as Scientific Advisor to the South African Government in connexion with the new industrialisation programme in South Africa.

The company are retaining the services of Mr. E. K. Moessmer as Technical Consultant for the development of all Ekem machinery, and have taken over the staff, installations, and factory of Ekem Engineering Ltd., London.

The head office of Busby, Winter and Co., Ltd., will remain at 22 and 22A Broad Street Avenue, E.C.2; Telephone: London Wall 6801, but all matters connected with Ekem machines will be dealt with at the Ekem Works, 9-11 Andover Place, N.W.6; Telephone: Maida Vale 2867.

British Industries Fair, 1948

The demand for space at the 1948 British Industries Fair has been exceptionally heavy and both the London and Birmingham Sections now have a waiting list of late applicants.

Total space applied for to date in the London Section is 684,000 square feet, which compares with the total area of 531,000 square feet available at the last Fair. That figure, however, will show a slight increase in 1948 due to an alteration in the space devoted to display features and in the rearrangement of gangways at Earl's Court. Despite this and a cut of about 20 per cent. in the space asked for by accepted applicants, it has been necessary to place over 200 late applicants, requiring over 47,500 square feet, on a waiting list.

A similarly heavy demand has been experienced by the Birmingham Section, which has a waiting list of 627 firms, including 385 definite applications for 99,000 square feet of space.

There will be over 8,000 exhibitors representing at least eighty-seven United Kingdom industries at the Fair, which will be held simultaneously in London and Birmingham from May 3 to May 14, 1948.

Mechanical Handling Exhibition

GOVERNMENT APPROVES OLYMPIA DEMONSTRATION

With the approval of the Government and the support of leading associations in the industry, a new exhibition—the First National Mechanical Handling Exhibition and Convention—is to be held at Olympia, London, from July 12 to 21, 1948.

The exhibition will show how mechanical handling can save labour and speed production, assembly, storage, and transport in every type of industry and will demonstrate to the world's buyers the efficiency of British-made plant and equipment. The exhibits will include aerial ropeways, conveyors, and elevators; coal, coke, and ash-handling plant; cranes, gears and chains, hoists, stackers, pulley blocks, and lifting gear; hand-trucks, power-driven industrial trucks, runways, wagon-tippers, pneumatic handling plant, and all types of accessories.

Concurrently with the exhibition there will be a convention at which papers will be read on various aspects of handling and an industrial film programme.

Battery Electric Vehicles

RECORD OUTPUT FOR 1947

The growing popularity of the electric vehicle is indicated by the fact that Ministry of Transport returns show that while 867 new "electrics" were registered in 1938, the registrations were 1,415 in 1946 and for the first ten months (January to October) of 1947 they totalled 2,285.

These figures do not include the type of electric vehicle known as a "pram," the "driver" of which walks in front and controls it from that position. This type of battery vehicle is largely a post-war development, and no figures are available as to their number in 1938. In the ten months, January to October of last year, 1,086 electric prams were registered compared with 1,205 for the whole of 1946.

Reasons for the popularity of the electric vehicle are that it is unaffected by petrol rationing or power cuts, its batteries being charged overnight when the demand on power stations is at its lowest, it is silent when running, and gives off no noxious fumes. The cleanliness of both the van and its driver explain why butchers, bakers, dairymen, grocers, laundrymen, and other tradespeople form such a large percentage of the users of "electrics."

The many other advantages of the electric vehicle are set out in a 16-page illustrated brochure, printed in six colours, entitled "How to Reduce Your Delivery Costs," which has been published by the Electric Vehicle Association of Great Britain.

Some examples of the various types of battery vehicles are illustrated, and details are given on their performance, maintenance, driving, general reliability, and approximate cost of running. It is also pointed out that the insurance companies evidently appreciate the inherent safety of the electric vehicle, in view of the fact that their premiums for this class of insurance are much lower than for any other mechanically propelled vehicle.

Laboratory Chemicals

For many years May and Baker, Ltd., have been supplying chemicals for laboratory purposes to Government departments, universities, wholesale distributors, research organisations, and large industrial consumers, but, apart from the use of their standard pharmacopoeial labels where applicable, they have been supplied without published reference to the standards of purity maintained by the Company's control laboratories.

The issue of a specification brochure including the new range of some five hundred chemicals, to specifications evolved during many years of fine chemical manufacturing experience, is aimed to cover the everyday requirements of laboratory practice. New labels, carrying the specification to which each product is guaranteed to conform, are a clear indication to the technician of the field of laboratory practice which each product will serve.

Standardised packing in the sizes indicated in the price list enclosed in the back cover pocket of the brochure will facilitate the maintenance of stocks.

University Development Campaign

An appeal for contributions to Sheffield University's development fund has been made by the development campaign secretary. Present plans for the expansion of the University provide for the accommodation of four times as many full-time students as were admitted in pre-war days, with corresponding development in research.

New Light Van

Restyled in the modern manner and well advanced in its technical innovations, a new version of Commer's light van is now available. Chromium radiator grille, streamlined wings with neat motif and integral, long-beam headlamps, disc wheels and massive bumper combine beauty of line with the practical advantages of easy cleaning and accessibility.

A new conception in ease of control is "Synchromatic" finger-tip gear change which is not merely a transposition of the gear lever from its old position to the steering wheel, it incorporates a new "crash-proof" gearbox, a new linkage, and new finger-tip control.

Power is furnished by a 35 b.h.p. four-cylinder side-valve engine, which along with the clutch and gearbox forms a self-contained unit having special "cushioned power" three-point mounting to damp out all vibration.

With a body capacity of 100 cubic feet, full width rear doors and easy entry all round, this "Supervan" is very suitable for local delivery work.

Appointments

Mr. Hartland Thomas has joined the Council of Industrial Design to take charge of its Industrial Section which is directly concerned with offering a practical service to industry on design problems, and particularly with helping industries to set up their own Design Centres.

*

Mr. E. A. Langham has relinquished his appointment as sales manager, in the Sales Division of The British Aluminium Co., Ltd., to take up a new appointment as general manager for the company in India.

*

Mr. E. B. Bennion, M.Sc., F.R.I.C., has been appointed Director of Studies and Training for the Student Apprenticeship Scheme for Greater London Bakeries, Ltd., the London Regional Company of Allied Bakeries. In view of having taken up these duties he has relinquished his appointment as Chief Production Manager of H. W. Nevill, Ltd.

Presentation to Mr. Facchino

The first meeting of the newly elected Executive Council of the Ice-Cream Alliance, on December 4, was marked by the presentation to the past President, Mr. Anthony Facchino, of a silver salver bearing an inscription and the signatures of all members of the Executive Council during his period of office.

Oil Purification

The recent development of purification of oil is the De Laval continuous purification method by which whale, herring, liver, and seal oils, and animal fats are handled. This development is described in a recently issued booklet published by Alfa-Laval Co., Ltd. The de-lecithinising, neutralising, washing, bleaching, and deodorising of soya, groundnut, rape, cottonseed, and linseed oils are also described, as well as the methods for the neutralisation and refining of crude oils, both of animal and vegetable origin.

Mr. F. W. Sadgrove

In consequence of the rapid development of the activities of Batchelor's Peas Ltd., further assistance has become necessary in general matters relating to marketing, and to this end the appointment of Mr. F. W. Sadgrove as marketing director has been announced by the company.

Formerly sales manager of the Icilma Co., Ltd., and subsequently assistant branch manager of the Manchester sales office of Lever Bros. Port Sunlight Ltd., Mr. Sadgrove was, during the war, given the responsibility of launching the Container Recovery Service which today operates on behalf of many individual companies and Ministries and retrieves over one million packages per week.

Packaging Research

An increase in income and a number of new members are announced in the Annual Report, 1946-1947, of the Printing and Allied Trades Research Association. This was the first year of the new terms of Government grant, member firms subscribing £24,100 and the Department of Scientific and Industrial Research £12,100, compared with £14,800 and £8,000 respectively for the previous year.

Feeling that the present title of Patra does not adequately describe its activities, the Council are proposing to change the name to The Printing, Packaging and Allied Trades Research Association.

Packaging research includes the development of standard test methods for water vapour penetration of packaging materials and the examination of a new method of measuring the degree of sizing of paper. Work is being continued on the treatment of board for grease resistance and on the resistance to mould and insect attack of packaging and bookbinding materials.

Geneva Tariff Agreement

A White Paper giving a report on the Geneva Tariff negotiations and on the General Agreement on Tariffs and Trade has been published.

Copies of the Schedules giving details of the new tariff rates are available for consultation at the Chambers of Commerce listed below:

London, Glasgow, Birmingham, Manchester, Bradford, Bristol, Cardiff, Derby, Huddersfield, Hull, Leeds, Leicester, Lincoln, Liverpool, Luton, Newcastle-on-Tyne, Middlesbrough, Northampton, Norwich, Nottingham, Oldham, Portsmouth, Preston, Sheffield, Southampton, Stockport, Stoke-on-Trent, Swansea, Walsall, Wolverhampton, Aberdeen, Dundee, Edinburgh, Belfast;

also at the following regional offices of the Federation of British Industries:

Newcastle-on-Tyne, Leeds, Bradford, Sheffield, Nottingham, Leicester, Cambridge, London, Reading, Bristol, Birmingham, Manchester, Liverpool, Glasgow.

Traders can also consult reference copies of the Schedules at the Export Promotion Department of the Board of Trade, 35, Old Queen Street, London, S.W.1.

Obituary

It is with deep regret that we announce the death, on December 9, of Mr. C. H. Foyle, founder and chairman of Boxfoldia Ltd.

For the last three years Mr. Foyle had not been able to participate actively in the management of the company, but, in addition to directing policy, he maintained the keenest interest not only in the organisation of production but also in social development within the business, and in the work of the Charles Henry Foyle Educational Trust which he established in 1940 by transfer of half of his Ordinary shareholding in the company.

He took a wide view of the scope and responsibility of industry, and the sound and far-sighted principles which he laid down will continue to govern the operation of the company and the Trust, to both of which his death is an irreparable loss.

F.M.S. Bulletin

The high standard set by previous F.M.S. bulletins, has been maintained in the recently published December issue which records, with many illustrations, the activities of the company during the past year and some sidelights on the personnel engaged in those operations. In addition to items of general interest, the bulletin contains technical articles on such subjects as vegetable drying, unfermented apple juice, and fuel economy.

Export Service

The present national drive for exports has caused many firms to become export-minded, many of the larger food manufacturing organisations in this country having created their own export department. There are, however, many smaller concerns who cannot afford to organise and maintain such a department, as the volume of their available export productions would not justify it.

M. Senator (Exports) Ltd. place at the disposal of such firms wishing to sell their productions of manufactured foodstuffs abroad a service equivalent to the medium or small size manufacturer running his own export department without any cost to himself, and places at his disposal a wide range of overseas representation which he would find the utmost difficulty in establishing for himself.

All merchandising is arranged through the company's own representatives in all parts of the world who deal with all formalities and insurances. The removal of this burden of responsibility is of value to the small organisation with little time to spare except for dealing with its productions and domestic merchandising.

"The Romance of Bermondsey"

First established 130 years ago, B. Young and Co., Ltd., have issued a booklet showing some aspects of everyday life in their Bermondsey factory where "Spa" food gelatine, a product of two years' standing on the consumer market, is manufactured.

Vegetable Shredder and Dicer

A handy machine for the preparation of vegetables and other foodstuffs is a shredder and dicer. It has seven cutter discs and two special attachments, and can be quickly adapted for slicing thin, thick, medium, or scalloped slices; dicing large or small squares; coarse or fine shredding; coarse or fine crumbing; and cutting thick or thin chips. It is made by Medcalfe and Co., Ltd.

Lectures on Dairying

The course of seven lectures on "Modern Developments in the Dairy Industry" held at the Chelsea Polytechnic commenced on January 21, with an inaugural lecture by Mr. M. J. Matthews, President, Society of Dairy Technologists, on "The Development of Milk Machinery." Succeeding lectures are as follows:

January 28 and February 4: "Recent Developments in Research in Dairying," with special reference to the work of the National Institute for Research in Dairying, by Professor H. D. Kay.

February 11 and February 18: "Modern Technological Control of Dairy Products," by Dr. J. G. Davis.

February 25 and March 3: "Modern Methods of Costing in the Dairy Industry," by Mr. R. F. Daly.

The lectures are designed to provide up-to-date information for persons holding management or executive posts in the dairy industry, for dairy laboratory workers, food chemists, public health officers, and public analysts. Admission to the lectures will be arranged on payment of 7s. 6d. for the course or 2s. 6d. for each pair of lectures.

R.I.C. Spring Programme

The first part of the Spring Programme of the Royal Institute of Chemistry is as follows:

Feb. 9. "Relationship between academic and industrial research" (jointly with Alembic Club). Dr. F. A. Freeth; Sir Robert Robinson, Nobel Laureate, in the Chair; at Oxford University, Physical Chemistry Laboratory, 8.15 p.m.

Feb. 12. "The chemistry of packaging" (inspection of laboratories). Dr. G. L. Riddell; at Messrs. Horlicks Ltd., Stoke Poges Lane, Slough, 6.30 p.m.

Feb. 18. "Function of the expert witness in litigation." Lionel Heald K.C.; at Wellcome Research Institution, 183, Euston Road, N.W.1, 7.30 p.m.

Feb. 20. "Relationship between academic and industrial research" (jointly with Cambridge University Chemical Society). Dr. F. A. Freeth; at Cambridge University University Chemical Laboratory, Pembroke Street, 8.15 p.m.

Feb. 23. Film display at Norwood Technical Institute, Knight's Hill, S.E.27, 7 p.m.

Feb. 24. "Reactions of benzoyl peroxide." Prof. D. H. Hey; at Welwyn Garden City, The Cherry Tree, 8 p.m.

Feb. 28. Film display at Zoological Theatre, Reading University, 3 p.m.

Mar. 1. "Nutrition in relation to post-war problems." Dr. F. Wokes; at Central Library, Hempstead Road, Watford, 7.30 p.m.

Instrument Technology

London meetings of the Society of Instrument Technology for the remainder of the 1947-1948 session, to be held at the Royal Society of Tropical Medicine and Hygiene lecture theatre at 6.30 p.m. for 7 o'clock, are as follows:

February 24: "Infra-Red Methods of Analysis and Control," by H. W. Thompson, F.R.S. Chairman: The President, Sir George Thomson, M.A., F.R.S.

March 30: "An Experimental Electrical Pressure Meter for Measurement of Furnace Roof Differential Pressures," by S. S. Carlisle, M.Sc., A.M.I.E.E., B. O. Smith, B.Sc. Chairman: Sir Ewart Smith, M.A., M.I.Mc.E.

April 27: "Some Impressions of Modern American Instrumentation," by A. J. Young, B.A., B.Sc. Chairman: Sir Charles Goodeve, O.B.E., D.Sc., F.R.S.

May 25: Annual General Meeting, followed by "Proposed System of Instrumentation Symbols," by J. K. Burkitt, B.Sc.(Eng.). Chairman: The President, Sir George Thomson, M.A., F.R.S.

Change of Address

The address of the Purchasing Officers' Association is now 17/18, Henrietta Street, London, W.C.2, telephone TEMple Bar 3011.

Pattern for Progress

A film of the complete processes of making steel, sheet and tinplate from the basic materials to the finished article as carried out at the Ebbw Vale Works of Richard Thomas and Baldwins is to be shown to workers and staffs throughout the company's organisation in order that all may be acquainted with its scope.

Paper Restrictions

Faced with the necessity of imposing restrictions in the supply of paper to their customers and of accounting for the distribution of their supplies to the Paper Control, indicating the usage to which it is being put, the National Association of Paper Merchants ask customers to give the fullest possible information to establish the essentiality of the purposes for which they require paper or board.

In announcing that allocations will be reduced for the twenty-sixth period, the Board of Trade state that even with the reduced allocations the requirements for export and for essential home uses must be met, and to this end the B.1 form procedure has been revised so that for printings, writings, and boards of all descriptions, B.1 forms now have to be completed *for all sales*, and for wrappings (including corrugated paper) B.1 forms have to be completed for *all sales over 2 cwt.*

The usage (detailing the actual trade and purpose) is to be subdivided under three heads: (1) For export purposes; (2) Indirectly in connexion with exports; (3) Home requirements.

"Design Weeks," 1948

During 1948, Design Weeks will be held in Cardiff from April 12 to 17, in Manchester from June 21 to 26, and in Birmingham from October 11 to 16. Preliminary plans have now been completed and the programmes will include a series of conferences between manufacturers, retailers, and industrial designers, the showing of special films, and possibly exhibitions of the work of student designers and National organisations.

General view of electrolytic tinning plant in the Ebbw Vale works of Richard Thomas and Baldwins, Ltd.

Essential Oils

Founded by J. L. Hindle in 1923, Standard Synthetics Ltd. specialise in the manufacture of highly concentrated terpeneless oils, including peppermint, lemon, orange, and lime flavours.

For soft drink manufacturers this firm produces concentrated soluble citrus flavours of orange, lemon, and lime and, for those who wish to make their own essences, a full range of natural oil and aromatic chemicals is available, their compounded fruit flavours giving excellent results in boiled goods and chocolate centres.

Caterers Amalgamate

The National Society of Caterers to Industry has merged with Caterers' Association of Great Britain. At a recent Extraordinary General Meeting of the Society its voluntary winding up was proposed and carried as a Special Resolution.

Formed in February, 1942, the Society has played a large and important part in promoting the interests of industrial caterers, and it has been ably represented on such bodies as the Catering Committee of the British Tourist and Holidays Board, the Catering Trade Conference of the Ministry of Food, and the National Council for Hotel and Catering Education.

During the last two years the Society and Caterers' Association have worked in the closest co-operation with representatives on each other's governing bodies, and the Society's Council is of the unanimous opinion that the time is now ripe for an amalgamation of the kind contemplated.

Under the new arrangement Caterers' Association is to set up a special division to deal with industrial and staff canteen problems. This division will have its own Committee of Management, and will be represented upon the Association's Council. Its members will be full members of Caterers' Association, and will receive all advantages of Association membership.

All members of the N.S.C.I. and members of Caterers' Association with industrial catering interests will be invited to join the new Industrial and Staff Canteen Division of Caterers' Association.

Phantomyser Equipment

Full details of how air sterilisation and pest destruction can be achieved by means of a Phantomyser are described in a booklet published by Aerosols Ltd. The technique of the production of a cloud of suitable liquids in aerosol form for killing insects, bacteria, and mould spores is described.

Jelly Crystal Packs

Silver and black form the basic colouring of the new cartons designed for Holbrooks "Host" jelly crystals, the colouring of the "Host," the jelly bowl, and the background to the figure being varied to match the colour of the variety of jelly contained in the pack.

Capital Increase

Powers to increase their Preference share capital by £200,000 (of which £150,000 is now being issued) and their Ordinary share capital by £37,000 have been taken by A. Boake, Roberts and Co., Ltd.

National Canning Company

The payment of a dividend of 15 per cent. plus a bonus of 5 per cent. was recommended at the sixteenth ordinary general meeting of the National Canning Co., Ltd., Mr. S. W. Smedley, chairman and managing director, presiding.

Filter Manufacture

At the annual general meeting of the British Society of Associated Filter Manufacturers emphasis was laid on the Society's aim to set and maintain recognised high standards in filter manufacture and performance. Some time ago, at the Society's request, the British Standards Institution set up a special Sub-Committee to formulate suitable standards of filtration, purification, and testing, and it is hoped that before long these standards will be finalised and adopted by members so that intending purchasers might be assured of a guarantee of value from the Society's members.

The retiring President, Mr. C. G. Vokes of Vokes Ltd., said that in these times of unrest in industry there was a tendency for manufacturers to be apathetic and consequently to neglect associating themselves with organisations which could safeguard their industries and build up strong positions for companies of high integrity before the present sellers' market gave way to stronger competition. It was, therefore, the desire of the Society to rouse manufacturers to the advantages of membership to ensure that the organisation may be as fully representative of the industry as possible.

Mr. S. C. Toye, of Amal Ltd., was elected President for the ensuing year, with Mr. E. Cowell, of Ozonair Ltd., as Vice-President.

OBITER DICTA

- Rationing should end about April, prophesies an expert. But he is careful not to mention which year. — *"London Opinion."*
- While many bellies will ache this winter, no amount of belly-aching will add to the supply. —*S. T. Swingler, M.P., in a letter to "The New Statesman and Nation."*
- I ain't saying nothing. You've found the stuff—that is all there is about it. You ain't found the body.—*Defendant sentenced for killing a pig without a licence.*
- A concern which makes marmalade now uses for containers the candied shell of oranges or grapefruit; the customer eats not only the marmalade but the jar.—*"New York Post."*
- A Leeds detective who suspected a man "because he smelt strongly of meat," was commended by the Stipendiary Magistrate, Mr. Ronald Sykes. —*"Yorkshire Evening News."*
- I conjure up a picture of countless butchers abed and dreaming of a circle of rabbits chasing each other. Naturally, their bedspreads are striped as are their aprons.—*Correspondent to the "Meat Trades' Journal."*
- One way of judging our economic condition is to compare how long it takes the American wage-earner to earn the price of the things he buys. In 1939 it took eight minutes to earn a loaf of bread, today six.—*Mr. Paul S. Willis, President of the Grocery Manufacturers of America.*
- How is it that this extremely corpulent naval rating shown on a propaganda drawing handed out in H.M.S. *Triumph* showing a fat sailor and starving civilian, who has obviously been engaged in consuming his shipmates' rations, should be wearing three good conduct badges? — *Lieut.-Com. Braithwaite, M.P.*
- If we are to be kept much longer undernourished without food while John Strachey misses sardines and buys snoek, I would not say that the housewife is going to hold the plate in her hand much longer. She is going to let it fly.—*Miss Dorothy Crisp, chairman of the British Housewives' League.*

Board Changes

Mr. H. C. Clark has resigned the office of chairman and retired from the Board of Foster Clark Ltd.

Lieut.-Col. Sir Cyril V. Jones, C.B.E., formerly the deputy chairman, was unanimously elected to the office of chairman as from January 1, 1948. Closely connected with the work of the Food Manufacturers' Federation, Sir Cyril represents that body on the Food Industries Council, and is also a member of the Executive Committee and Grand Council of British Industries.

Empire Sugar Supplies

That our dependence on sugar supplies from dollar areas would delay our return to a pre-war level of consumption was emphasised by the Rt. Hon. Lord Lyle of Westbourne, President of Tate and Lyle, Ltd., at the forty-fifth annual ordinary general meeting of the company, who urged the country to look to the Empire for supplies hitherto obtained elsewhere. The British Government had contracted to buy all the sugar the Empire could produce up to 1949. The incidence of the Imperial preference granted on sugar was the corner-stone of this policy and Lord Lyle welcomed the Government's action in maintaining the level of this valuable safeguard to supplies.

Increased consumption, lack of manpower, and the diversion of sugar supplies to the Near and Middle East were quoted as the main reasons for the sharp drop in Empire supplies from 75 per cent. during the 1936-1939 period to 25 per cent. of ration requirements in 1946.

The expansion of the Empire sugar industry was possible given proper encouragement, and Lord Lyle spoke of his company's interests in the production of sugar in Trinidad and Jamaica where everything possible was being done to increase the output from their factories in those islands.

The dividend recommendations in the report, including a final dividend of 10 per cent. on the Ordinary shares making 13½ per cent. for the year subject to income tax, were approved.

Paris Trade Fair, 1948

SPACE REQUIREMENTS EXCEED INITIAL ALLOCATIONS

The total surface already booked by exhibitors for the 37th annual *Foire de Paris*, to be held from May 1 to 17, exceeds the 360,000 square yards available. A new hall of 14,350 square yards floor space is being erected to meet part of the demand.

Machinery and furnishing trades will occupy the largest space allocations. Electricity, radio, plastics, fancy leather goods, perfumery, and jewelry are all increasing their space requests, plastics being notable in this respect.

Pre-war dimensions will be exceeded also by the food section, which will occupy a hall of 11,960 square yards. In the wine section alone more than 600 firms will be exhibiting on 180 separate individual stands, covering a surface of 2,392 square yards.

British and American firms will be well represented again, particularly in the machinery section.

Australian Wheat and Meat

Shipments of wheat from the new crop, estimated at 220,000,000 bushels, are to be received by Britain, India, and Ceylon.

A two-year extension of her long-term meat contracts until September 30, 1950, has been approved by Britain, who is also prepared to negotiate before December, 1948, a further extension beyond 1950 of the contract originally made for four years ending September, 1948. Prices will be agreed annually and for the present year those operating between October, 1946, and September, 1947, will apply. There is, however, no provision in the new agreement for an annual price review for pork.—*Reuter.*

Canada's Trade Fair

Reservations for the first Canadian International Trade Fair to be held in Toronto from May 31 to June 12 have been accepted for more than 1,050 separate exhibits representing the products of twenty-five different nations. Food displays are expected to be among the largest representing companies from the United Kingdom, U.S.A., Brazil, Hong Kong, Colombia, the Bahamas, Greece, South Africa, India, and China. One of the most unusual will be a display of edible birds nests from the Orient, other exhibits including soda fountain equipment, dehydrated foods, and chocolate manufacturing.

Improved Rice-Milling Machine

A new rice-milling machine which is expected to retain most of the vitamin content of rice is undergoing examination by Malayan food experts, its object being to mill rice in such a way that while retaining most of the vitamins, the rice would be white and palatable.

Dr. Lucius Nichols, Food Adviser to the South East Asia Special Commissioner, and the Institute of Medical Research in Kuala Lumpur, are examining the new machine, which is expected to be installed in the Government Rice Mill in Alor Star, Kedah, for a demonstration.

U.S.A. and Food Problems

A programme to meet the feed emergency of the United States and to aid in solving the world food problem has been published in booklet form by the Doane Agricultural Service in collaboration with the American Meat Institute.

Caused by the short corn crop and the necessity of continued large exports of food grains, the feed emergency throughout the United States can be met without disrupting the livestock, dairy, and poultry programmes of farmers by making more use of the ample hay supplies to make up some of these shortages. Alfalfa meal, for instance, could be made available in much larger quantities and protein by-product feed supplies will be near or in excess of the record large supplies of the past year.

Careful planning, skilful use of available feeds, and elimination of inefficiency in handling livestock and poultry would go far towards providing food for the hungry peoples of the world.

Not from Dixie

Then there's the copy Thelma Walker of Y and R wrote for the current Birds Eye insertion. Headline: "Try Cradle of Peas—with Birds Eye Peas, *mind!*" Copy goes: "First, snuggle sweet, young, can't-be-matched Birds Eye Peas and celery in a sauce of diced ham . . . Then serve in a cradle of crisped French bread savoury with garlic-tinged butter . . . and you have the year's swellest way to fix the swellest peas of all time!" Maw, git out in that kitchen right now! . . . *Advertising and Selling, New York.*

Taste Testing Research

A taste testing institute is being established at Stanford University, California, by industrial groups throughout the U.S.A. The organisation, which is non-profit making, at present employs only female tasters to test women's reactions to various frozen foods, but later experiments will employ men too. It is claimed that the findings will enable producers and manufacturers to predict how well their products will sell and to whom.

An enterprising method of similar research is being practised by a New York firm who have put into operation a mobile research unit equipped as a modern kitchen. The vehicle is parked in busy areas and passers-by are asked to participate in taste testing. They are offered several samples of food, only one product being tested at a time, and are asked to state their preferences as regards strength of flavour and so on. The project has proved highly satisfactory in determining the public's flavour preferences and will be extended to areas outside New York.

Eire's Economic Recovery

PART TO BE PLAYED BY INDUSTRIAL EXPANSION

As American aid will only temporarily solve Eire's problems, considerable industrial expansion will be necessary if that country is to balance her total trade this year. Imports in 1947 were £90,000,000 while visible exports were £30,000,000 leaving a gap of some £60,000,000.

Invisible exports will help to close the gap but it is the food manufacturing industries, utilising the natural wealth of Eire's central grassy plain with its huge herds of cattle, the agricultural produce of the South, the increasingly important sea fisheries along the coast, on which the country will particularly depend.

Although agriculture is considered of predominant importance an independent economic existence would be impossible for Eire without manufacturing industries to supplement it, and those planning to build new factories have been promised every assistance by the Government. The Minister for Industry and Commerce recently stated that if dollars for the purchase of necessary equipment not obtainable from sterling countries could not be made available from current dollar earnings, resort to the International Monetary Fund of the International Bank would be considered.

Fuel difficulties will have largely disappeared early this year and industrialists have been advised to place firm orders for capital equipment as Eire intends to use all her diplomatic resources to expedite delivery.

Commenting on the talks which Eire had last year with the British Government, the Irish Minister for Industry and Commerce has said that there was no question now in Britain that the maximum development of Irish economic resources and potentialities was in any way detrimental to British commercial interests, but was a natural and inevitable policy which would afford Britain for many years ahead an expanding market in Eire for capital goods and industrial materials.

Anglo-Canadian Agreement

The new Anglo-Canadian trade agreement has been described by Mr. Gardiner, Canadian Minister of Agriculture, as so far "an agreement in principle only."

Under the agreement which was regarded as the best possible compromise in the circumstances, the price of wheat would stay at $1.55 a bushel for the remainder of the year ending next July 31, and would be $2 a bushel for the following crop year.

There would be a change in prices for bacon, beef, cheese, and eggs, but these would not be announced until discussion with the British mission was completed.

Although the contracts would be considerably less than the former commitments for bacon, beef, cheese, eggs, and poultry, they would still be broad enough to provide a solid marketing programme for the mass of Canadian farmers.

Livestock in New Zealand

A review of New Zealand's livestock position is contained in a report made as a result of a recent visit by Mr. L. J. Cook, R.D.A., to investigate the organisation of animal research work in the Dominion. Sheep farming yielded during 1934-1944 approximately 25 per cent. of the total production. Of the 34 million sheep present in 1945, 21 million of them were breeding ewes, and as there are over 32,000 owners of sheep, the average size of flocks is 1,000 head. An average of 10 million fat lamb carcasses have been exported annually during recent years, and these have been produced largely by the mating of Southdown sires with crossbred ewes, with a large dominance of Romney Marsh blood. Mr. Cook comments on the remarkable freedom from serious disease and outlines the valuable work in progress by the Animal Research Division of the Department of Agriculture in dealing with some of the main troubles with sheep, *e.g.* internal and external parasites, foot rot, rickets, enterotoxaemia, and pregnancy toxaemia.

A survey of dairy cattle, beef cattle, and pigs in the Dominion revealed that there are approximately 1,750,000 milking cows in New Zealand of which 85 per cent. are Jerseys, the present average production per cow being 230 lb. of butterfat per lactation. Beef cattle total approximately 1,680,000 head, and for specialised production the Aberdeen Angus, Hereford, and Shorthorn herds predominate. The pig population in 1945 totalled 600,000, including 78,000 sows, and, as New Zealand is not a grain producing country, food for pigs consists mainly of offal from dairies, factories, and meat works, with pasture and a minimum of grain.

"Meatless Meat"

Canada is to be the sole producing country of "meatless meat," a product developed by Dr. Barnett Sure of the University of Arkansas from powdered skim milk, defatted soybean meal, brewers' yeast, and cracked whole wheat flour. Said to compare favourably on a weight basis with lean meat in proteins and to exceed it in vitamins, it smells and even looks like meat.

Locusts and Groundnuts

Britain's East African groundnut scheme will fail if strict locust control is not applied, according to delegates at a recent conference on red locust experiments in Pretoria.

Delegates from many African Governments, including the Union of South Africa, the Belgian Congo, and British Colonial Governments, spoke of the success of last year's anti-locust experiments, especially of air-to-ground operations.

This year, experiments are to be conducted in the use of aircraft manoeuvring to force locust swarms to fly through "a curtain of poison."

NEWS FROM THE MINISTRIES

Appointments

Mr. John Hutt, M.B.E., a Principal Assistant Secretary in the Ministry of Food has been seconded to the Chinese Government for duty as Adviser to the Chinese Ministry of Food.

*

Mr. J. W. Knight has resigned his post as Director of Oils and Fats Division and has been succeeded by Mr. L. G. Fisher.

*

Major-General T. W. Richardson, O.B.E., Deputy Divisional Food Officer, has been promoted to fill the vacancy which occurred on the resignation of Mr. E. A. Edwards, M.B.E., as Divisional Food Officer for the Midland Division.

Selling Prices of Fats

The wholesale margins on cake and pastry margarine, lard, compound cooking fat, and dripping have been increased by 8d. per cwt., and the retail margin on lard and domestic cooking fat by 1s. per cwt. to cover the increased costs of distribution.

The following changes in first hand and wholesale prices have also been made:

Dripping.—The first-hand price will be increased by 1s. per cwt. to 119s. 9d. per cwt., and the wholesale price by 1s. 3d. per cwt. to 125s. 3d. per cwt.

Lard and Domestic Cooking Fat.—The first-hand price will be decreased by 1s. 3d. per cwt. to 90s. per cwt., and the wholesale price by 1s. per cwt. to 95s. 6d. per cwt.

There will be no change in retail prices.

American Tribute to British Ministries

LASKER GROUP AWARD

A Lasker Group Award for 1947 was presented by the American Public Health Association to the British Ministries of Food and Health "for the unprecedented programme of food distribution in Great Britain" during the war, "with resulting improvement in the health of the people." These awards, which take the form of statuettes of the "Winged Victory of Samothrace" provided through the generosity of the Albert and Mary Lasker Foundation, are made either to individuals for their achievement in the field of medical research and public health administration or to groups for outstanding work or research, where it is impossible to single out any one individual. This is the first award to be given to a foreign country.

The citation states:

"Long before the World War II, the Medical Research Council and the health authorities of Great Britain had been active in promoting research and in spreading knowledge of nutrition among the people.

"In 1937 an Advisory Committee on Nutrition was set up by the British Ministry of Health, which undertook a survey of the national diet. The background had therefore been developed before the outbreak of the war for the first large-scale application of the science of nutrition to the population of the United Kingdom. A separate Ministry of Food was established with wide executive powers over the production and rationing of foods, the purchase of foods from abroad, and the education of the public in the proper use of available foods. By the effective employment of its great powers, the Ministry of Food, in consultation with the Ministry of Health and with the advice (on all matters which might affect the health of the people) of a Standing Committee under the chairmanship of the Chief Medical Officer, succeeded to a remarkable degree in providing a diet for all the workers of the country in conformity with their physiological requirement, irrespective of income.

"Although almost all other environmental factors which might influence the public health deteriorated under the stress of war, the public health in Great Britain was maintained and in many respects improved. The rates of infantile, neo-natal, and maternal mortality and of stillbirths all reached the lowest levels in the history of the country. The incidence of anæmia and dental caries declined, the rate of growth of school children improved, progress was made in the control of tuberculosis, and the general state of nutrition of the population as a whole was up to or an improvement upon pre-war standards.

"In the opinion of the Lasker Awards Committee, this has been one of the greatest demonstrations in public health administration that the world has ever seen. The Lasker Awards Committee of the American Public Health Association therefore takes great satisfaction in recommending awards for scientific and administrative achievement to the British Ministries of Food and Health and to the four great leaders in this historic enterprise, Lord Woolton, Sir Jack Drummond, Sir Wilson Jameson, and Sir John Boyd Orr."

Feedingstuffs Order

An Order which reduces the minimum requirement of animal protein in all National Pig and Poultry Compounds (except National Baby Chick Food) from 5 per cent. to 2½ per cent. came into force on January 5, 1948. The maximum in each case is reduced from 10 per cent. to 7½ per cent. The stipulated minimum requirement of undecorticated oilseed cake in National Cattle Food No. 2 is withdrawn. These changes are necessary because of the limited supplies of animal protein and the larger coupon issue during the winter rationing period.

Potato Stocks

Copies of the register of stocks of potatoes officially inspected while growing in England and Wales in 1947, and certified in respect of purity and freedom from severe virus diseases and wildings may be obtained from the Minstry of Agriculture and Fisheries, Lytham St. Annes, Lancs, price 1s.

Onion Prices

The maximum prices for homegrown and imported onions will be reduced from about the end of February until the end of June to the level operative before November 9, 1947. At the end of June, the present maximum prices will be restored and remain in force while the 1948 homegrown crop is being marketed.

Food from Australia

BRITISH REPRESENTATIVES TO DISCUSS PRODUCTION PROBLEMS

As a result of recent discussions between the Minister of Food and the High Commissioner for Australia arrangements have been made for a number of British representatives to visit Australia in the immediate future. They are:

Mr. L. A. Plummer: Chairman-Designate of the Overseas Food Corporation.

Mr. A. J. Wakefield: Member-Designate of the Overseas Food Corporation. Leader of the Mission to East Africa which recommended the East African Groundnuts Scheme. Previously Inspector-General of Agriculture in the West Indies and Director of Agriculture in Tanganyika.

Sir Henry Turner: Controller of Meat and Livestock in the Ministry of Food.

Mr. J. W. Rodden: Director of Dairy Products in the Ministry of Food.

Mr. J. Peacock: Director of Eggs in the Ministry of Food.

Dr. J. Brooks: Department of Scientific and Industrial Research.

Mr. C. W. Strutt: A Livestock Husbandry Advisory Officer in the Ministry of Agriculture.

Mr. D. H. McPhail: An Officer of the Meat and Livestock Division in the Ministry of Food.

There will be separate discussions on dairy products and eggs before the general discussions which are being arranged with the appropriate Australian Authorities at Canberra, probably in the third and fourth weeks in January. It is expected that the whole range of Australian livestock and crop products will be reviewed at Canberra, with special attention to those most needed in the U.K. and for which the prospects of increased production in Australia are most promising. Following these discussions it is expected that the British representatives will at the invitation of the States visit various parts of Australia.

Sir Henry Turner will be particularly concerned with exploring the possibility of a large development in beef production, particularly in Northern Queensland, in Western Australia, and in the Northern Territory. He will also investigate the possibility of developing pig production in Australia. Mr. Rodden will discuss the development of dairying and the possibility of increasing supplies of dairy products from Australia to the United Kingdom. Mr. Peacock and Dr. Brooks are discussing the development of egg production. Mr. Plummer and Mr. Wakefield will explain the role of the future Overseas Food Corporation in Britain's drive to improve her own and the world's food supply.

The Australian Authorities will thus be enabled to judge whether any schemes for increasing their food production would be facilitated by some form of co-operation with the Corporation. The Overseas Food Corporation is interested in the production of any kind of food or animal feedingstuffs required in the U.K., and Mr. Plummer and Mr. Wakefield will have a particular interest in the possibilities of growing groundnuts and other oilseeds on a large scale in Australia and New Guinea.

Raw Cocoa Prices

Because of unprecedented high world prices, which are governed by the New York market, an Order has been made increasing from January 4, 1948, the selling price of West African Cocoa in the United Kingdom from 119s. to 225s. 6d. per cwt. (plus duty) *ex* store.

Animal Feedingstuffs

An Order has been made which increased, from December 8, 1947, the maximum prices for feeding bone flour and bone meal, meat meals, meat and bone meals, herring meal, imported fish meal, whale meat meal, whale meat, and bone meal. The increases were authorised because of rising costs of production.

Prices of Oils and Fats

No changes will be made in the prices of refined oils and imported edible animal fats allocated to primary wholesalers and large trade users during the eight-week period ending February 28, 1948.

Citrus Fruit Prices

A new Order which came into force on December 1, 1947, increases from 8 to 9 the number of grades for the classification of citrus fruit according to condition and substitutes new tables of maximum prices on first-hand sales and sales by wholesale in respect of such grades. These changes result from a new wastage clause in the recent citrus fruit contract with Palestine.

The Order also provides for three new types of package for bitter oranges with a corresponding adjustment of the delivery charges.

Home Grown Grains

Owing to higher costs of distribution the Minister of Food has agreed to increase merchants' margins on sales of home grown grains. This has been done by amending the Home Grown Grains Orders to prescribe higher maximum prices for merchants' sales of wheat, non-millable dredge corn, and beans; and higher maximum and minimum prices for merchants' sales of oats, malting and millable barley. Prices for growers' sales are not affected.

The effect of the new Orders, which came into force on January 1, 1948, is to increase the existing prices on merchants' sales by, in most cases, 1d. per cwt. on wheat, 1½d. per cwt. on barley and 2d. per cwt. on oats, dredge corn, and beans.

In consequence of these increased prices, the Minister of Food has further amended the Feeding Stuffs (Maximum Prices) Order, 1946, to provide for corresponding increases from January 1 of the prices of processed grains and imported grain. The items affected are processed wheat, oats, beans, and dredge corn, and imported wheat and oats.

Information and Advice

Literature on Fish Canning

B.2190. *Required, literature on fish canning.* (London.)

An illustrated article, "Sardine Canning in Britain," appeared in FOOD MANUFACTURE in April, 1932, being an account of a fish-canning factory situated in this country equipped with the latest plant and machinery.

In October, 1933, a fairly comprehensive article appeared on sardine canning in California, and in December, 1934, and January, 1935, a further article on the Californian outlook.

Other references of a general character published in FOOD MANUFACTURE are:

"Canadian Canned Sardines." 1941. Page 116.
"Drying of Sardines" (Enquiry). 1940. Page 192.
"Pilchards: Life History, Preservation, and Canning." 1936. Page 390.
"Sardine Canning in California." 1935. Page 7.
Sardines:
Aluminium cans for (Enquiry). 1934. Page 185.
Canning (Editorial). 1934. Page 79.
Canning in California. 1934. Page 421.
Lead in (Editorial). 1934. Page 39.
"Canning of Pilchards in Cornwall." 1934. Page 386.
"Sardine Canning." 1933. Pages 323, 329, 362, 396, 404.
"Sardine Canning in Britain." 1932. Page 111.
"Sardine Canning." 1931. Page 313.
"Sardine Canning Industry in Portugal." 1931. Page 22.

Glacé Cherries

B.2194. *Required recipe for glacé cherries.* (India.)

The following is a recipe for glacé cherries, which is given as a basis for experiment:

The cherries are first exposed to sulphur fumes for about five hours in a sulphur cabinet. They are then put into wooden buckets covered with water in which 1 oz. of sulphite of soda to each twenty quarts of water has been dissolved.

The cherries are pitted and blanched and kept in cold running water for about an hour, and then allowed to dry out on hurdles. The canning is done by glacing the cherries in earthenware jars and pouring a syrup of 22° Beaumé over them (when boiling), leaving one hour, then draining the syrup and boiling to 24° and again pouring over the cherries. Leave for twenty-four hours, drain the syrup and sugar, and boil to 25°, pouring over the cherries. Repeat the operation three times more every second day. The strength of the syrup is then to be increased to 27°. Three days later drain and increase to 28°. Three days later increase to 30°, adding to the syrup a small quantity of carmine to colour the cherries red. Resume the draining four days later, boiling the syrup at 32° by addition of glucose instead of sugar. Repeat this operation twice. At the next boiling increase the strength of the syrup to 33° by adding more glucose. This operation is repeated until the syrup is found to remain at 33° after four days' contact with the fruit, which will show that they have absorbed all the sugar possible. The cherries should then be transparent and full of light and colour.

Information Supplied

B.2177. *Suppliers of liquorice root and extract, and cloves.* (N. Ireland.)

B.2178. *Manufacturers of a small hand-operated label gumming machine.* (Eire.)

B.2179. *Suppliers of machinery for packing and weighing sausage meat into Cellophane packing or similar containers, other than sausage casings.* (Caerns.)

B.2180. *British firms specialising in the quick-freezing of fruits, vegetables, eggs, meat, poultry and game, and fish.* (Belgium.)

B.2181. *Manufacturers of machinery used in bacon factories for the removal of the blade bone, and suppliers of wrapping materials.* (Eire.)

B.2182. *Suppliers of herring boning and fish washing machinery.* (London.)

B.2183. *British manufacturers of potato crisps.* (Sweden.)

B.2185. *Suppliers of small high-pressure cookers for processing meat and fish pastes.* (Yorks.)

B.2186. *Suppliers of canned herrings.* (Yorks.)

B.2187. *Manufacturers of equipment for the production of pure wine yeast.* (Kent.)

B.2188. *Manufacturers of continuous ice cream freezers.* (New Zealand.)

B.2196. *Literature on flavours and essences.* (London.)

B.2197. *Manufacturers of machinery for topping, tailing, and peeling onions for pickling.* (Yorks.)

B.2198. *Suppliers of machinery for frying fish cakes.* (Lancs.)

B.2200. *Suppliers of lactose and dried whey powder.* (Surrey.)

B.2202. *Manufacturers of Christmas, christening, and wedding cake decorations.* (South Africa.)

B.2203. *Manufacturers of plastic brine vats.* (London.)

B.2205. *Literature on citrus fruit juices.* (London.)

B.2206. *Manufacturers of bottle washing machinery.* (London.)

B.2207. *Suppliers of electric mixing machinery.* (Warwicks.)

B.2208. *Suppliers of fat extenders and emulsifiers.* (Devon.)

B.2209. *Manufacturers of machinery for pulping and slicing pineapples.* (Northumberland.)

B.2210. *Suppliers of machinery used in the manufacture of fondant.* (Warwicks.)

Recent Patents

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents," and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

589,828. ALLEN, F. J., WILSON, J. E., and DAVENALL, E. J.: Mounting of the doors of refrigerators, ovens, stoves, or the like.

589,830. POULTON AND NOEL, LTD., and BOSTOCK B. R.: Dehydration of potatoes.

589,876. CHIVERS AND SONS, LTD., WILLETTS, A. K., and RENDLE, T.: Production of mashed potato powder.

590,068. FARISH, T. G.: Closures for jars and like containers.

590,079. CREAMOLA FOOD PRODUCTS, LTD.: Apparatus for closing and sealing fibre or cardboard boxes or cartons.

590,147. PATON, CALVERT AND CO., LTD.: Closures for canisters, boxes, containers, and the like.

590,111. GRAHAM-ENOCK MANUFACTURING CO., LTD.: Bottle capping machines.

590,187. FEAR, E. D.: Treatment of milk or milk products.

590,223. FEAR, E. D.: Frozen food products.

590,421. HALL, J. AND E., LTD., and PERNET, F. H.: Apparatus for freeze drying.

590,498. GOLDEN STATE CO., LTD.: Process for producing dried milk powder.

Abstract of a Recent Specification

Machines for Making Crisp Bread

The invention relates to those machines for making crisp bread in which the dough string moves under a rotating pricking roll, the axis of which is perpendicular to the longitudinal direction of the dough string. Machines for making crisp bread generally have the drawback that dough sticks to the pins of the pricking roll, which in its turn entails that more and more dough sticks to the pins so that they are liable to get stuck in the dough. Consequently, the dough string is raised from its support and accompanies the pricking roll in its rotation, the drive being thereby disturbed. Moreover, such arrangements require constant inspection of the pricking roll.

These drawbacks are eliminated by a device which is characterised by the fact that two brushing rolls (brushes), which are parallel with the pricking roll and which rotate at different speeds, are connected to the drive device of the pricking roll and are so arranged that they at least contact each other and rotate in opposite directions, the brush which is situated first, viewed in the direction of rotation of the pricking roll, being located in such a way that it cleans only the outer portions of the pricking pins while the other brush is located in such a way that it forces its way to the roll carrying the said pins so that the whole pricking roll is effectively cleaned.

588,852. *Karl Edvard Lundström and Aron Birger Svensson.*

Trade Marks

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

FANOR.—644,821. Preparations in powder form for making puddings and baking powder. **Usines Dr. A. Oetker Société Anonyme,** 9, 10, and 11, Allée Verte, Brussels, Belgium; Manufacturers.

TANSUL.—645,218. Preparations for the clarifying and stabilising of alcoholic beverages. **American Tansul Co.** (a Corporation organised under the laws of the State of California, U.S.A.), 1489, Folsom Street, San Francisco, State of California, U.S.A.; Manufacturers.

SARDILENE.—646,511. Fish oil prepared for food for animals and for poultry. **F. E. Booth Co., Inc.** (a Company incorporated under the laws of the State of Nevada, United States of America), 280, Battery Street, San Francisco, State of California, United States of America; Manufacturers. Address for service is, c/o, English Brokers Ltd., Balfour House, Finsbury Pavement, London, E.C.2.

"T".—646,546. Chocolate and confectionery (not medicated). **Chocolat Tobler, Ltd.,** 20, Soho Square, London W.1; Manufacturers.

RONDO'S.—646,658. Cocoa, chocolate, confectionery (not medicated), biscuits (other than biscuits for animals), cakes, pastry, ices, honey, and treacle. **N.V. Cacao- en Chocoladefabriek "Union,"** 45, Paul Krugerkade, Haarlem, Holland; Manufacturers and Merchants.

KANDY KID BAR.—647,024. Chocolate filled bars and sugar confectionery bars, all being unmedicated candy. **Alfred Howard Scrase, Maurice Robert Scrase, George Percival Clarke,** and **Winifred May Geering,** trading as **Young Randall and Co.,** 77, Lansdowne Road, Croydon, Surrey; Manufacturers.

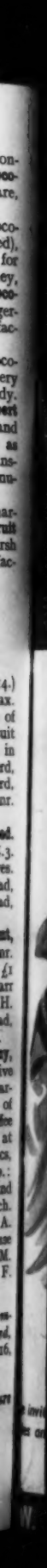
BRIAR DENE.—647,059. Jam, marmalade, and fruit curd. **Purefruit Preserving Co., Ltd.,** 49-57, Marsh Road, Middlesbrough; Jam Manufacturers.

New Companies

Yorkshire Moulds, Limited. (437614.) Iona Works, Iona Street, Halifax. To carry on bus. of manufacturers of and dealers in chocolate and biscuit moulds, etc. Nom. cap.: £10,000 in £1 shares. Permt. dirs.: R. Ford, 12, Heath Avenue, Halifax; I. Ford, 6, The Avenue, Hipperholme, nr. Halifax.

Alliance Bottling Company, Limited. (437616.) 5, Mitre Street, E.C.3. Nom. cap.: £1,000 in £1 shares. Dirs.: B. Flitten, 25, Trebovir Road, S.W.5; W. Vincent, 76, Elsham Road, W.14.

Laboratory Thermal Equipment, Limited. (437648.) Greenfield, nr. Oldham. Nom. cap.: £5,000 in £1 shares. Dirs.: W. Heathcote, Carr Lane, Greenfield, nr. Oldham; H. Parkin, Chumleigh, Armitt Road, Grasscroft, Greenfield, nr. Oldham.

Leslie Duerden and Company, Limited. (437649.) Co-operative Chambers, Manchester Road, Barnoldswick. To take over bus. of manufacturers of and dealers in toffee and sugar confectionery carried on at Clegg Street Works, Brierfield, Lancs, by Leslie Duerden. Nom. cap.: £3,000 in 4,000 ord. shares of 5s. and 2,000 cum. pref. shares of £1 each. Dirs.: L. Duerden and Mrs. A. Duerden, both of 172, Newhouse Road, Marton, Blackpool; Mrs. D. M. Birbeck, Mrs. M. Ingham and D. F. Duerden.

Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C. 2.